Development of an Individual Case Formulation Rating Scale

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Abstract

CBT treatments guided by case formulations have been overshadowed by more standardised methods of therapy in current service delivery models, due to the evidence base for formulations limited reliability, validity and clinical utility. A more unified and explicit approach to formulation and formulation training is required to establish an evidence base for formulation driven approaches. The individual case formulation (ICF) model (Hallam, 2013) offers a functional and systematic approach to case formulation using protocol driven conventions.

This study sought to empirically test Hallam's (2013) ICF diagramming conventions. As no suitable measure of ICF formulation skills exists the primary focus of the present study was to develop and assess a rating scale of ICF skills. The ICF rating scale was assessed in terms of its reliability and validity. The elements of the ICF model that can be taught declaratively through workshops were assessed and the potential predictive validity of learning ICF skills upon clinical outcome was explored.

Novice cognitive behavioural therapy trainees' formulation skills were assessed before and after attendance at an ICF training workshop. Evidence was found that there were a significantly higher amount of formulation skills demonstrated from pre to post the workshop. The ICF rating scale demonstrated acceptable inter-rater reliability and internal consistency (Chronbach's alpha .91). Validity assessed in terms of correlation with

therapists' CBT competence or years of clinical experience was not demonstrated, but tentative evidence of the predictive effects of attending ICF training on clinical outcome were found.

Whilst the conclusions of the study are limited due to the sample size and methods used, the ICF rating scale demonstrated emerging reliability. Further research is needed to establish validity of this measure in different settings, particularly across different experience levels of therapists. The study concluded that further research focused on the ICF model is warranted due to promising findings that ICF skills can be improved with a one-off training session.

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Formulation (also known as case conceptualization) is the starting point for most talking therapies. It is an aspect of therapy that is highly regarded by many therapists; however, despite its prominence in clinical work, it has only recently become a focus of research. This review will focus on the evidence base for formulation in CBT and will present the individual case formulation model (Hallam, 2013). The relationship of formulation skills to therapeutic outcome, differences in the quality of formulations across clinicians, and the relationship between clinical experience and formulation skills are discussed. The implications for how formulation skills are taught to novice therapists and how the quality formulation skills are measured are also explored. The general aim of the project is to provide initial evidence for a way of measuring individual case formulations that will allow for a further evidence base to develop.

What is formulation?

Formulation is a way of drawing on psychological theory to describe and explain individual clinical presentations in a way that is coherent and personally meaningful to the client (Dudley, Park, James, & Dodgson, 2010). Many analogies place formulation at the centre of therapy. It has been described as a “lynch pin” that holds clinical theory and practice together (Butler, 1998) as a “road map” (Grant, et al., 2008), the “heart” of evidence-based practice (Bieling & Kuyken, 2003) and the “bridge” between the presenting client and the research literature (Blackburn, James, & Flitcroft, 2006). Formulation is positioned as central to the process of undertaking CBT

(Kuyken, Padesky, & Dudley, 2008), there is, however, little consensus about what a formulation should contain and what is essential to the process. Within CBT there are many different methods of formulation (Table 1). These methods share many features in common but also emphasise different elements as essential. Most, however, assert that a formulation needs to make sense of difficulties, plan for therapy, ensure appropriate treatments are used, prevent relapse, and be aware of difficulties that may arise during therapy (Blackburn, et al., 2006).

In practice therapists often use eclectic approaches based on these concepts but in a less formalized manner; however, the prevalence of formulation used by therapists is unknown partly because formulation methods are so diverse (Key & Bieling, 2015). The methods of delivery of formulations also vary; for some, formulation should be conducted early in CBT before intervention (Eells, 2010) whilst others suggest it should be a continual process and open to refinement (Waddington & Morley, 2000). Formulations can also be presented in many forms; however, most recommend a written or diagrammatic formulation over oral presentation to facilitate communication with the client, allow for longitudinal comparison and re-formulation (Sim, Gwee, & Bateman, 2005).

Table 1. Common models of formulation in CBT

Author	Formulation elements promoted in the model
Beck et al., (1987) modified by Beck (1995)	A cognitive model that includes current aspects of the person's problems portrayed in terms of maintaining cycles between negative thoughts and other cognitive, emotional, behavioural and physiological symptoms. Includes a developmental understanding of difficulties. The developmental aspects include early experiences, core beliefs about the self, others and the world, dysfunctional assumptions that act as rules for living. The current difficulties are perpetuated by critical incidents that conflict with dysfunctional assumptions or activate core beliefs.
Persons (1989) and Persons and Tompkins (2011)	A cognitive behavioural model with six essential parts to the formulation; the problem list, automatic thoughts, hypothesised underlying mechanisms, an account of how the mechanism produces the problem, precipitants of the current problem, origins of the mechanism from early life history and predicted obstacles to intervention.
Padesky and Mooney (1990) modified by Padesky & Greenberger (1995)	A cognitive behavioural formulation with a focus on maintenance cycles to formulate the client's problems in the here and now. Focused on the way in which cognitions, physical symptoms, behaviours and emotions all interact with one another in the context of the environment that includes personal, social and historical factors. A hypothesis that change in any one area of the formulation will affect another component.
Butler (1998)	A cognitive behavioural model that includes: general relationships between thoughts, feelings and relationships between moods and types of thought in specific situations. Should also contain both functional and dysfunctional beliefs, vicious cycles that maintain the problems, predisposing factors, precipitating factors. Formulations should include examples of specific situations to illustrate maintaining cycles or patterns.

Despite these differences, formulation is promoted as it is more person centred and less pathologising than other frameworks (Tarrier & Calam, 2002), and can accommodate broader influences on a person such as their social power (Hagan & Donnison, 1999), their systemic context (Tarrier & Calam, 2002), and their cultural context (BPS, 2011). There are many presumed benefits of a good formulation including: improved descriptions and understanding of presenting problems, enhanced therapeutic alliance, and a guide from which clinicians can tailor a treatment based on modifiable hypotheses (Hunsley & Elliott, 2014). Despite these presumed benefits there is very little evidence to evaluate these claims. With a large evidence base for the efficacy and effectiveness of cognitive therapy more broadly, the outstanding challenge is to provide a scientific basis to the formulation, which is currently a "weak link" in the model (Bieling & Kuyken, 2003).

The origins of formulation

Formulation has its roots in psychological theory. Since the introduction of clinical psychology professional regulation in 1969 (BPS,1969) formulation has been promoted as a central skill for clinical psychologists. Explorations of the origins of the use of the term "formulation" reveal that it was used to establish clinical psychology as an autonomous, distinct and alternative profession from psychiatry (Crellin, 1998). Psychiatry would classically tend to use diagnostic categories and using formulation was a way of annexing treatment and identifying clinical psychologists as specialists with expert skills (Crellin, 1998). Formulation is still considered a critical competency in the practice of clinical psychology (Johnstone & Dallos, 2006) and is enshrined in

the literature surrounding the profession of clinical psychology across all levels and in all specialties (BPS, 2011).

A report by the Man Power Advisory Group (MPAG, 1990) investiagated the unique competetncies of clinical psychologists with interviews and by giving practitioners case vignettes. Results of this review showed that whilst other professionals used psychological skills and techniques only psychologists could formulate and respond to complex problems in terms of broad-based psychological knowledge. This view that the skill of formulation as unique and exclusive to those trained in clinical psychology has been challenged more recently with suggestions that formulation should form a part of the training of psychological wellbeing practitioners (Roth & Pilling, 2007), mental health nurses and social workers (Crowe, Carlyle & Farmer, 2008).

Summary. Formulation is suggested to be essential in CBT interventions. It is purported to be a bridge between the presenting client and research base but at the same time is a weak link in an otherwise strong evidence base for CBT more generally. The multiple models of formulation within CBT result in formulation being applied inconsistently, and there is a lack of agreement around if formulation is a skill unique to psychology or to be used more broadly by other professionals. There is also no evidence to guide therapists on which methods are preferable. Assumptions are made that a formulation benefits the therapeutic process, but these assumptions have yet to be evidenced. A more unified and explicit approach to formulation is required to evidence the claims about the benefits of formulation driven

interventions.

The Individual Case Formulation (ICF) model

The ICF model (Hallam, 2013) offers an interesting perspective on formulation that aims for conceptual clarity and grater objectivity when producing formulations. The model is not exclusively for use with CBT, it is an atheoretical functional formulation model compatible with a variety of explanatory models and presenting problems. The model is not opposed to nomothetic knowledge but Hallam, (2015) argues that these methods are only relevant to solving a subset of problems. The ICF model offers a distinctive idiographic approach that allows for the therapist to build a unique picture drawing from a variety of theoretical principles and knowledge. Crucially the final formulation may not resemble anything that has been produced before (Hallam, 2015). The ICF model combines explicit instruction on the thinking used to develop a formulation and uniform methods of depicting the formulation diagram.

The ICF model starts from the position of taking each client's problems as unique and suggests that time should be invested in functional analysis of behaviour. Research shows interventions that contain pre-intervention functional assessment offer significant clinical improvement over those therapies that do not (Hurl, Wightman, Haynes, & Virues-Ortega, 2016). The time and resources needed to conduct pre-intervention assessment were also found to outweigh the therapeutic gains that followed (Hurl et al., 2016). Moorey (2010) suggests using simple rules of diagramming such as

distinguishing description from explanation and using different symbols for correlation and causation to depict these relationships. This allows for the depiction of the functional relationships and provides a guide for intervention.

A core feature of the ICF model is that it differentiates between the observations and descriptions of the client's difficulties and the hypothesis that the clinician draws from the evidence base. Others have highlighted the importance of formulations being based on tentatively held hypothesised mechanisms that are a starting point for intervention and that are subject to enquiry (Persons & Thompkins, 2011). The ICF approach outlines explicit suggestions on how to approach formulation by providing descriptions of the various reasoning processes that are involved. Hallam (2013) also claims that there is room for improving training in formulation skills using standardised formulation diagramming and has devised several conventions for systematic diagramming (Table 2). The ICF model includes a standardised approach to formulation diagramming, something that has typically been done ad hoc.

This model gives explicit suggestions on how to approach formulation. It offers a way of increasing explicit hypotheses and mechanisms and therefore increases uniformity. However, the ICF diagramming conventions have yet to be empirically tested. Hallam (2013) suggests that the currently held positions on case formulation will be fiercely held and slow to change. However, the ICF model could help to address the problems with the evidence base that are a central weakness of existing literature on formulation (Kuyken et al., 2005).

Table 2. ICF Diagramming conventions (Hallam, 2013)

Elements of an ICF formulation	Description	Depiction in diagram
Observations	Descriptive item such as client's thoughts, feelings or sensations. Can be triggers and responses. These are low inference elements, the "facts" of the case that therapist and client can agree on.	Circle
Interpretations	These elements explain how observations are linked together. These can be inferences, hypothesis and conjecture. These can be based on established evidence based principles if these exist. The aim is to make the interpretations that are being drawn explicit. Hypothesis are more likely to be sources of disagreement and evidence will need to be gathered.	Squares
Causal links	The causal links between observations e.g., (A $\rightarrow$B)	Single headed arrows indicating directionality
Reciprocal Relationships	Observations have a mutual influence on each other e.g., (A$\leftrightarrow$B)	Bi-directional arrows
Functionally equivalent items	Items that are correlated but not causally related	Double Line
Relationships with an amplifying effect	-	Plus symbol
Relationships with a dampening effect	-	Negative symbol
Moderating factors	A variable that influences the strength of relationship between other variables	-
Mediating factors	A variable that explains the relationship between two other variables	-

Summary. The ICF model offers an idiographic and functionally based approach to formulation diagramming. This approach could provide a platform to address the difficulties in the evidence base by creating uniformity in the principles and application of formulation.

Nomothetic versus idiographic approaches

Returning to the conceptualisation of formulation more broadly, it is placed in the literature as a skill that is both a science and an art (Eells, 2010). Individualised approaches have provoked criticism for their subjectivity and use of “unrestrained clinical judgment” (Wilson, 1996, p. 229). Proponents of this view prefer to emphasise top down nomothetic interventions that use generalized explanatory models of psychological disorders. Nomothetic interventions are on a spectrum. Disorder specific models allowing for some individuation but demanding the use of specific mechanisms are at one end and exacting manualized treatments that rarely allow for deviation from the prescribed model are at the other.

Generalized disorder specific interventions are multiple. Taking anxiety disorder as an example, many formulation models and protocols based on diagnosis are recommended (Table 3). The evidence base for these models is vast, as a result many are developed into manualized treatments that prescribe what a therapist should do to demonstrate adherence to the model and offer “best practice” (Roth & Pilling, 2007).

Table 3. Key models and protocols for anxiety disorders (Westbrook, Kennerley & Kirk, 2009)

Anxiety Disorder	Reference
Generalized anxiety Disorder (GAD)	Wells, (2007); Borkovec, Newman, Pincus, & Lytle, (2002)
Health Anxiety	Salkovskis & Warwick, (1986)
Obsessive-compulsive disorder (OCD)	Salkovskis, (1985, 1999) Wells, (2007)
Panic and agoraphobia	Clark, (1986, 1999); Wells (2007)
Post-traumatic stress disorder (PTSD)	Ehlers & Clark, (2000)
Social Anxiety	Clark and Wells (1995); Wells (2007);
Specific phobia	Kirk and Rouf (2004)

There is debate about how idiographic and nomothetic approaches sit together. Hallam (2013) highlights that there is a difference between including nomothetic elements in a formulation and making diagnosis the central aim of assessment. Idiographic and nomothetic approaches are not mutually exclusive. Some sugggest that manualized interventions contain implicit case formulations (Persons, 2008) and are often more individualized than may be assumed (Eells, 2011). Combining idiographic and nomothetic features in a “flexibility within fidelity’” model (Kendall & Beidas, 2007) is advocated in

some treatments, for examaple, PTSD, as highly structured manuals do not provide complete treatment of patients' multiple problems (Hickling & Blanchard, 1997). However, others have explicitly cautioned practitioners to think twice before introducing modifications to their manual-based treatment (Fairburn et al., 1993). Additionally, some consider formulation to involve extending clinical skills into something more thoughtful, formal and planned than adapting a standard protocal (Key, & Bieling, 2015).

In the debate about approaches to treatment, manualized and disorder specific treatments are often emphasised as they offer multiple advantages over formulation driven treatments: they are easy to learn, more practical to supervise and train and easier to disseminate (Wilson, 1996). Manualized treatments are more focused (Fairburn et al., 1993) and provide cost containment due to their time-limited nature (Hayes, 1995). Because of these advantages idiographic approaches appear to have been demoted in recent models of service delivery (Hallam, 2013), for example, in the service delivery model of Improving Access to Psychological Therapies (IAPT; Department of Health, 2008) put forward by the UK government. IAPT services follow a stepped care model of treatment delivery. After an initial assessment, clients in IAPT receive either low intensity manualised interventions (e.g., telephone or computer based CBT) or high intensity interventions (more traditional disorder specific CBT). Clients may transition from low intensity interventions to high intensity or vice-versa. In low intensity interventions, there is little scope for individualized case formulations as most assessments will involve structured clinical interview and brief standardized symptom rating scales

(Brown & Clark, 2015). The IAPT initiatives' focus on stepped care provides a range of treatment options with the best evidence available at each level of care. For some, case formulations are viewed as narratives or "therapist stories imposed on the client" (Corrie & Lane, 2010), therefore this focus upon evidence based treatments over and above formulation especially with less complex cases is an improvement. The idea here is that IAPT trainees are equipped with the skills to implement interventions at the lower level of the stepped care approach, leaving only the most severe, intractable or cases where an evidence based treatment does not yet exist for referral on to formulation driven intervention with a clinical psychologist.

The IAPT model continues to grow including more and more client groups and services and other European countries are considering similar initiatives (Berge, 2011). The more nomothetic interventions offered by the IAPT model has undoubtedly improved access to psychological therapies; however, the focus of the evidence base and interventions has initially been on working age adults with diagnostic and statistical manual of mental disorder, 4th Edition (DSM-IV; American Psychiatric Association, 2000) Axis 1 disorders (Department of Health, 2008). Whilst there has been some extension of IAPT services to include young people and children (Shafran, Fonagy, Pugh & Myles, 2014), there are still limits in what they can provide for service users outside of these groups and those that require adaptation to standard protocols such as older adults (Laidlaw et al., 2003) and those with learning difficulties (Dodd, Joyce, Nixon, Jennison, & Heneage, 2011). In these cases, formulation is often emphasised because it can offer support with cases that

are challenging and complex (Persons & Bertagnolli, 1999). Formulation is also useful for people with comorbid difficulties, cases with multiple treatment providers (it aids decision making regarding what to target first) and presentations not covered by protocol driven interventions (Key, & Bieling, 2015). These factors point towards the ongoing relevance of individualised interventions.

Despite the potential benefits and perceived need for formulation within the scientist-practitioner model, evidence is required to justify its use. In trying to balance the views of those that advocate for formulation driven approaches and nomothetic approaches, it has been argued that a formulations contribution to improved treatment outcome should be the primary criterion upon which formulation in CBT should stand or fall (Bieling & Kuyken, 2003).

Summary. Whilst nomothetic and idiographic approaches are not mutually exclusive, views tend to polarise. The debate between these two models of service delivery hinges again on the proposed benefits of formulation. With more standardised treatments offering explicit evidenced models that are cost effective and simpler to disseminate there is a real need to provide an evidence base for formulation driven interventions.

Formulation and Clinical Outcome

The evidence base for formulation's impact on clinical outcome is limited. Research suggests that formulation driven interventions have good treatment outcomes. For example, in case report with a client with bulimia nervosa (BN)

a formulation driven approach that integrated CBT with interpersonal elements offered a reduction in BN symptoms, alcohol abuse and depression and the end of therapy and improvements were maintained at an 18 month follow up (Hendricks & Thompson, 2005).

When comparing formulation and standardised treatments research has suggested that the two approaches are equivocal (Emmelkamp, Bouman & Blaauw, 1994; Jacobson et at. 1989; Persons, Roberts, Zalecki, & Brechwald, 2006). When comparing 22 participants experiencing OCD both individualised and standardised treatments were found to be equally effective, both resulting in significant improvements on OCD symptoms, with improvements being maintained at two month follow up (Emmelkamp et al., 1994). Similar results were found by Persons et al., (2006) that 58 depressed and anxious participants with multiple comorbidities treated with formulation driven interventions had comparable outcomes to those reported in published randomized controlled trials (RCT's) of empirically supported therapies. These studies are problematic as they use single case and small n designs. Naturalistic studies without comparison groups have limited generalisability to other contexts. Additionally, equivocal findings such as these further add to the need to question the necessity of formulation, as formulation is costlier in terms of clinician and service user time (Key, & Bieling, 2015).

Multiple studies have failed to support the idea that individualized treatments provide clinically significant improvements over and above manualized treatments (Emmelkamp, Visser, & Hoekstra, 1988, Ghaderi, 2006, Nelson-

Gray, et al., 1989, Schulte, Künzel, Pepping and Schulte-Bahrenberg et al., 1992). For example, Schulte, et al., (1992) compared three approaches to the treatment of specific phobias. The comparison was between individualized therapy in which therapists formulated and chose the treatment, standardized in vivo exposure treatment and a control treatment in which each participant received the therapy tailored to a participant in the individualized therapy condition. Results indicated that the standardised treatment was significantly superior to the other conditions both at posttreatment and follow-up two years later. These outcomes were consistent across differing degrees of clinical experience of the therapists. It was suggested that therapists using idiographic methods did not consistently target in vivo exposure, the key behavioural mechanisms (Schulte & Eifert, 2002). Whilst this study did look at the effect of clinical experience, it did not monitor the quality of the formulations. When considering studies of formulation driven versus standardised interventions, it is difficult to establish the integrity of the treatments without demonstrating that the treatments were competently delivered (Muse & McManus, 2016).

Another problem with this research comparing formulation driven and standardised treatments is that the designs use heterogeneous groups, for example, people with panic disorder. This is problematic as efficacy and effectiveness are not the same, and Hallam (2013) highlights that in clinical practice clients do not present with neat disorders as in research settings. This issue of heterogeneity has been borne out in IAPT settings, as services have struggled with delivering expected outcomes due to clients with complex

mental health needs accessing their services (Goddard, Wingrove & Moran, 2015). The use of homogenous groups in protocol driven approaches does, however, allow for use in RCT methodology. This method is deemed to be the "gold standard" and the best source of evidence for effectiveness as it provides a basis for generalizability, due to managing threats to internal validity (National Institute for Health and Clinical Excellence; NICE, 2006). With RCT's favouring nomothetic approaches, robust research designs that complement idiographic approaches must be sought. One approach is the use of single case experimental designs (SCED). SCED's are advantageous over traditional case studies which are criticized for being biased and unscientific (Kazdin, 1981). SCED's compare performance under different conditions within an individual, rather than either within or between groups (Kazdin, 1978). Rather than using a control group, SCED's rely on repeated measurement, following participants before, as well as during treatment (Turpin, 2001). Data collected during treatment is compared to data prior to treatment to determine whether a change can be associated with treatment onset, allowing participants to act as their own control.

This SCED methodology has been used to investigate the impact of formulation in four clients with psychosis (Chadwick, Williams and Mackenzie, 2003). It was found that formulation did not have a significant impact on any of the four clients on several standardised measures including therapeutic alliance, distress or psychotic symptoms. It was therefore concluded that no evidence was found that formulation in CBT has a direct impact on the symptoms of psychosis. Semi-structured interview reports suggested that

some clients felt formulations highlighted their difficulties as long term and complex. The findings were complex as, contrary to other findings, some clients described the formulations as helpful due to feeling increased reassurance, encouragement and optimism. Therapists also reported increased hope and sense of alliance when clients agreed with the formulations (Chadwick et al., 2003). This research highlights the importance of considering multiple outcome measures when assessing formulation.

Summary. Individualized treatments have a weaker evidence base than standardized methods of treatment delivery. Most current evidence favours the idea that nomothetic treatments are superior or that the two approaches are equivocal. With formulation driven treatments being associated with increased costs in time and training resources there is a need to provide evidence that formulation is a necessity to ensure that it is considered in future service delivery models. There are methodological difficulties with providing evidence for the nuances of idiographic approaches. SCED methodology may offer an approach to demonstrating evidence of the benefits of formulation although existing research has not found evidence.

Formulation and reliability

To improve the standing of formulation in research contexts its reliability needs to be established. Some have argued that as formulations are so dissimilar to psychological tests that the usual psychometric standards should not be expected (Eells, 2009); however, the challenge is to find the aspects of reliability and validity that are applicable and important to the advancement of

the evidence base for formulation. Reliability here refers to the degree of agreement and consistency between case formulations arrived at by different clinicians and requires a level of agreement about the key constitutes of a cognitive case formulation.

Most of the existing research around formulation is focused on reliability. Studies of reliability typically assess the extent to which clinician's conceptualisations of a client's difficulty are consistent with each other or that of an expert (Bucci, French, & Berry, 2016). Multiple studies (Dudley et al., 2010, Eells, Kendjelic, & Lucas, 1998 & Kuyken, Fothergill, Musa, & Chadwick, 2005) have found that clinicians demonstrate good reliability with an expert "benchmark" formulation around elements involving overt behaviours and emotion. On the other hand, these studies show that clinicians had poor agreement with theory driven components of the formulation. Reliability has been found to increase when clinicians are asked to formulate in groups (Persons & Bertagnolli, 1999). Greater reliability of the formulation was also associated with greater training (Persons & Bertagnolli, 1999), suggesting a need for clinicians to be provided with dedicated supervision and adequate training around formulation.

Other studies have shown variability in the reliability of formulations across different clinicians. Persons, Mooney and Padesky (1995) asked 46 therapists to formulate the overt difficulties and underlying mechanisms of two depressed clients by listening to a recording of an initial assessment. Good interrater reliability was found on their formulations for the overt problems,

83%-98%; however, agreement was much poorer for the subtler underlying mechanisms at 13% agreement. This suggests that there are individual differences amongst therapists in how the criteria of formulation are understood and applied. Similar results were found by Mumma and Smith (2001) who found reliability to be especially low for the inferential elements of formulations when clinicians formulated pre-recorded semi structured interviews.

Studying reliability in formulation presents methodological difficulties as formulation can be thought of as a process as well as an event (BPS, 2011). Many of the formulation reliability studies only use a single case as the source material (Dudley et al., 2010). This limits their generalisability and demonstrates a need for research into formulation using varied clinical case materials. Studies have tended to use vignettes as opposed to “real” case material. These vignettes provide a static “snap shot” and therefore do not share the dynamic elements of formulating in clinical practice (Dudley et al., 2010).

Summary. Research has yet to provide satisfactory evidence that formulations are reliable in the delivery of CBT interventions. For the evidence base for formulation to move forward improved training and more uniform methods of formulating are required.

Formulation, validity and quality

Validity in the context of formulation refers to what is meaningful and useful

about formulations, for example do they make sense to the client and do they add value to the therapy process for example, improve outcome. Several authors have pointed out that providing a quality, coherent and justifiable account of a person's presenting problems may be more important in formulation than the inter-rater reliability between therapists (Kuyken et al., 2005 & Persons, 2005). Hallam (2015) suggests this is important because clients come to therapy seeking practical wisdom rather than objective truth. Some suggest that the validity of formulation has barely been addressed in the literature (Johnstone, 2011). This is supported by Völlm (2014), who found that within a Delphi survey of professionals, there was no agreement regarding the best way to evaluate a formulation; therefore, to assess validity in formulations, it is essential to have a measure of the quality of formulations (Eels, 2010).

Research considering the quality of formulations assessed 115 cognitive behavioural therapists of different experience levels. Kuyken et al. (2005) used the Quality of Case Formulation Rating Scale (Fothergill & Kuyken, 2002) to assess quality of the formulations. Formulation skills scores ranged from very poor to good (“very poor” 22.1%; “poor” 33.6%; “good enough” 34.5%; “good” 9.7%) with only 44.2% of the formulations categorised as at least “good enough” (Kuyken et al., 2005). A “good enough” formulation was described as integrating relevant information such as: dysfunctional assumptions and compensatory strategies. A “very poor” formulation was described as displaying minimal integration and much irrelevant data. In this study, both clinician’s previous experience and accreditation levels (British

Association for Behavioural and Cognitive Psychotherapies, BABCP) were found to impact on the reliability and quality of the formulations (Kuyken et al. 2005). The unpublished scale used to judge these formulations has been criticised for having relatively unknown psychometric properties and having a limited scoring criteria (Bucci et al., 2016). The variability in the quality of formulations is nonetheless worrying and suggests a need for improved formulation training.

One of the difficulties in providing an evidence base for formulation is that it is a complex construct to measure. Bucci et al. (2016) conducted a systematic review of available measures of assessing the quality of formulations (Table 4). Of the eight measures assessed no single measure was validated for use across a range of settings. Bucci et al. (2016) outlined the Collaborative Case Conceptualisation Rating Scale (CCC-RS; Padesky, Kuyken & Dudley, 2011) as the most promising measure that showed potential reliability and validity in the context of live therapy; however, this measure has only been tested in the context of depression and requires intensive time resources and training. Bucci et al. (2016) concluded that due to the small amount of studies reviewing the validity of formulations and the diversity of validation methods used, that more research is required to develop and validate formulation scales by modifying existing scales or creating new scales.

Summary. The development of measures of quality in formulation is vital to establishing an evidence base for formulation driven approaches. There are measures developed assessing quality in CBT formulations and

evidence is emerging for their reliability and validity. There is not, however, a suitable measure that considers measurement of ICF skills and elements of formulation diagrams. To further assess the ICF model a scale needs to be developed to assess formulation skills demonstrated in case formulation diagrams.

Table 4. Measures of Assessing the Quality of Case Conceptualisation (Abridged from Bucci et al., 2016).

Measure, authors	Description of measure	Purpose	Strength of measure	Limitations of measure
Case Formulation Scoring Criteria (Page et al., 2008)	*Vignette based rating.* Six areas of evaluation; problem list, precipitating factors, perpetuating factors, provisional conceptualisation, problems that may hinder therapy and assets. 0-5 scale with higher score representing better quality conceptualisation.	Assess and benchmark skill in clinical training programs to provide psychology trainees with formative feedback.	-Easy to administer -Little training required	-Weak psychometric properties
Scoring of a Case Formulation Method (Dudley et al., 2010)	*Vignette based rating.* Eight component levels of conceptualisation e.g., trigger rated 0 (inaccurate), 1 (identified) or 2 (accurate).	Assesses case conceptualisation skills by way of level of agreement with three expert ratings.	-Easy to use -Clear scoring criteria -Good inter-rater reliability	-Based on video vignette so might not generalise to clinical practice
The Cognitive Behavioural Therapy Case Conceptualisation Rating Scale (Haarhoff et al., 2011)	*Vignette based rating.* Four categories including problem list, diagnostic, working hypothesis and treatment planning rated on 0 (absent) 10 (excellent scale).	To evaluate the content and quality of case conceptualisation produced by novice CBT clinicians.	-Adequate scoring criteria	-Based on vignette and might not generalise to clinical practice - Requires psychometric evaluation

Case Formulation Quality Checklist (McMurran et al., 2012)	*Vignette based rating.* Ten items on a four-point scale, using the 5 P's formulation template ratings vary from "very poor" to "excellent".	Designed to evaluate quality in forensic case conceptualisation.	-Established as reliable -Relatively easy to use	-Only applicable to forensic settings
Collaborative Case Conceptualisation Rating Scale (Padesky et al., 2011)	*Measure used for client seen in ongoing practice*. Examines three principles of CBT levels of conceptualisation, collaborative empiricism and strengths/reliance focus.	Reliably rate conceptualisation process and skill of CBT therapists. Supervisors provide feedback to trainees.	-Comprehensive scoring criteria -Good to excellent psychometric properties	-Complex to rate requires training. -Requires validation with clinical groups other than resistant depression
Case Formulation Content Coding Method (Eells et al., 1998)	*Measure used for client seen in ongoing practice.* To assess content of each clinically relevant category given 3 codes absent, somewhat present and clearly present.	Provides tool for reliability and comprehensively categorising the information that clinicians use in conceptualising a client.	-Comprehensive -Applicable to variety of client	-Time consuming, considerable training involved. -Inter-rater reliability but no other types
Quality of Cognitive Case Formulation Rating Scale	*Measure used for client seen in ongoing practice.* Overall quality is considered with a single quality score 1 (very poor), 2 (poor), 3 (good enough) 4 (good).	Measures inferential aspects of CBT case conceptualisation.	-Simple and easy to use	-Limited scoring criteria

(Fothergill & Kuyken, 2002)				
Rating the Quality of Case Formulation for OCD (Zivor et al., 2013)	*Measure used for client seen in ongoing practice.* Six dimensions; Relevance of information, accuracy, categorisation of data within the conceptualisation, threat appraisal, conceptualisation maps to clients experience according to CBT understanding.	Used to examine the effect of CBT training	-Relatively easy to complete	-Further psychometric evaluation needed -Limited to use within OCD

Expertise, experience and competence

The relationship between formulation quality and expertise, experience and competence has produced conflicting findings. When novice, experienced, and expert clinicians were compared in their ability to formulate a series of cases, the expert's formulations were found to be more comprehensive, elaborate, complex, and systematic than both the other two groups (Eells, Lombart, Kendjelic, Turner, & Lucas, 2005). It was not experience that predicted best performance but some level of expert knowledge. In this case, "expertise" was defined in terms of clinicians who had devised and published formulation systems or led workshops on the topic.

Another study has shown that expertise in the form of professional training via a PhD training lead to improvements in the quality of formulations (Persons 1996). These findings suggest that formulation is a skill that requires time, effort and resource to develop, which has implications for the clinical practice of formulation. Experts at this level are not commonplace in the workforce delivering CBT in clinical practice; therefore, these findings indicate a real need for an improvement in formulation training. Kuyken et al., (2005) however, suggest that improvements in expertise in terms of professional qualifications such as BABCP accreditation lead to incremental improvements in the quality of formulations.

The impact of expertise on formulations does, however, have mixed results. Using comparisons to expert "benchmark" formulations, Dudley et al., (2010) found that the level of academic qualification did not make a significant

contribution to formulation quality, whereas overall clinical experience did predict high formulation quality scores.

Another conceptualisation of expertise used in many training settings especially in IAPT settings highlight therapist “competence”. Therapist competence can be defined as the skilfulness of the therapist in conceptualising the patient’s distress and problems within a specific framework, and in applying recognized techniques or methods consistent with the goals of treatment (Shaw et al., 1999). The most widely used method of assessing competence is the Cognitive Therapy Scale- Revised (CTS-R Blackburn et al., 2001). The CTS-R is a 12-item scale rated by supervisors to measure trans-diagnostic cognitive therapy competence across different competence domains.

Within an IAPT setting, therapists are required to develop comprehensive competencies to formulate using the CBT model and receive tuition on disorder specific formulations. Formulation is considered a “generic metacompetency” (Roth & Pilling, 2007), it is not captured on the CTS-R, but trainees are required to develop competency in formulations that are flexible and appropriately adapted to ensure that the intervention is not reductionist or simplistic (CORE, 2017).

The relationship between CBT competence and formulation has recently been explored. Forty therapists delivering CBT for depression were rated on CTS-R (via audio tape) and on the CCC-RS (Padesky et al., 2011) as an assessment

of their formulation skills (Gower, 2011). Competence in formulation showed a strong positive relationship with general CBT competence. Additionally, competence in both formulation and general CBT was associated with better treatment outcome for depression as measured on the Beck Depression Inventory (BDI-11; Beck, Steer & Brown, 1996). These findings highlight that formulation is an important competence and that investing in training of therapists has the potential to enhance treatment outcomes.

Experience and expertise/competence are of course not mutually exclusive, more experienced therapists tend to be more competent (Shaw et al., 1999). There is, however, a need to establish what elements of formulation skills can be taught didactically and what can be learnt through experience alone. This distinction between declarative, factual knowledge (e.g., CBT theories) and procedural knowledge (e.g., how to apply CBT; Bennett-Levy, 2006) is an important area for future research, as there is currently little knowledge of how therapists acquire formulation skills. There is a clear need for research into the impact of training on case formulation skills.

Summary. Research into the relationships between therapist expertise, experience and competence has had differing outcomes. There is some evidence that these elements are associated with formulation skills. Additional research into these relationships is required to provide more evidence of the links. Evidence of the formulation skills that can be acquired via training will help to detail which of these elements are most implicated in the learnt elements of formulation skill as opposed to those elements learnt

through experience.

Training

Case formulation is a nuanced skill that novice clinicians can often struggle to master (Kanjelic & Eells, 2007). Many authors agree that formulation is a poorly- or under-taught skill (Ben-Aron & McCormick, 1980; Blackburn, et al., 2006; & Eells, Kendjelic, & Lucas, 1998). Formulation is also a topic that is frequently revisited post qualification as evidenced by the number of psychologists requesting and attending practical workshops on the subject (Butler, Chapman, Forman & Beck, 2006).

The way formulation skills are taught to trainee therapists is also under researched, therefore the impact of learning these skills on clinical outcomes is unclear (Kuyken, Padesky, & Dudley, 2011). Henry and Williams (1997) suggest that the problems with reliability of case formulations are caused by therapists finding formulation skills difficult to master.

The current state of training is that formulation methods are rarely taught at an introductory level, as formulation training tends to emphasise more difficult and complex cases (Key, & Bieling, 2015). This conflicts with professional guidelines that formulation training should be given at all levels of competency (BPS, 2011). Formulation skill development often relies on the use of case vignettes (Key, & Bieling, 2015). The use of an expert formulation as a benchmark is problematic as it implies that there is a “right” formulation and not that the formulation needs to be “good enough” to be useful (Dudley,

2010). Vignettes present formulation as a “grand summing up, in the manner of a trial judge”, which is very different to the nature of formulating in clinical practice (Hallam, 2013, p11). Some suggest that vignettes used in training foster “Inert knowledge” that is possessed but not applied in practice (Binder, 1993). Whilst it is acknowledged that there are no formal procedures for how to clearly replicate formulation in training and research, using real clinical case material may help add ecological validity to the formulating process in these contexts.

Guidance manuals describing how to develop formulations are an active area of publication (Mumma, 2011). There are many schemas to choose from as discussed previously (Table 1). Hallam (2015) suggests that whilst there is a large literature on how to construct a formulation, there is no guidance on how to include hypotheses. This is supported by Eells, Kendjelic and Lucas’ (1998) suggestion that poor quality case formulations often do little more than describe information with no hypothesis or underlying mechanism inferred. In addition, there are a growing number of protocols for CBT across different disorder specific areas (see Kuyken et al., 2011, p17 for review). The choice of formulation method can be overwhelming and in practice formulation protocols get mixed together in the case of comorbidity or abandoned altogether (Persons, 1995) as protocols are difficult to apply and adhere to (Aston, 2009). Qualitative research interviewing expert clinicians involved in assessing therapist CBT competency found that experts were undecided if specific protocol approaches were necessary or realistic outside of a research context (Muse & McManus, 2016). There was, however, disagreement with

this position, and other experts reported that knowledge of speicific protocals was essential to gain competancy in formulation (Muse & McManus, 2016).

In trying to solve these dilemmas for novice therapists it seems unhelpful to produce more and more protocols for different disorders as this is overwhelming for clinicians and it would be near impossible to cover all the exceptions in clinical practice (Persons, 1995). Few give accounts of what the formulation process procedurally entails, and the general advice for novice therapists is to seek supervision from those with more experience (Hallam, 2013). Persons (1995) suggested that training should teach principle-driven formulation protocols appropriate to different circumstances.

There is limited research into formulation training but encouragingly, a study of psychiatry trainees suggests formulation skills can be improved with a two-hour training workshop (Kendjelic & Eells, 2007). Kenjelic and Eells (2007) used the ‘Case Formulation Content Coding Method’ (Eells & Kendjelic, 1998) to assess the quality of formulations. This method rated formulations quality on four domains: symptoms and problems, precipitatorary stressors, predisposing life events and inferred mechanism. Each of these domains are rated on a five point Likert scale from ‘not presented’ though to ‘rudimental presentation’, ‘adequate presentation’ and ‘good’ and ‘excellent presentation’. Kendjelic and Eells (2007) found that those in the formulation training group produced better formulations than 86% of those in the control group. Whilst the measure of formulation used has only displayed reliability in limited areas (Bucci et al., 2016), this finding adds weight to the debate that formulation

skills can be taught declaratively. This research did not, however, follow up the effect that improved formulation skills had on treatment outcomes. A suggested way forward to explore the development of formulation expertise is to evaluate client outcomes before and after therapists receive training (Kuyken et al., 2011).

Summary. Therapists often struggle to master case formulation. Teaching methods are diverse and hindered by the number of models and because of the difficulty with replicating formulation in a training setting. Further studies are required to assess formulation training in terms of the elements of formulation skill that alter with training and effect of training on clinical outcome.

The current study

CBT treatments guided by individual case formulations have been over shadowed by more standardised methods of delivering therapy in current service delivery models, due to formulations limited evidence base in terms of reliability, validity and clinical utility. A more unified and explicit approach to formulation is required to evidence the claims about the benefits of formulation driven interventions. An approach that offers a platform for addressing these difficulties is the ICF model. This study seeks to empirically test Hallam's (2013) ICF diagramming conventions. As no suitable measure of ICF formulation skills exists the primary focus of the present study was to develop and assess a rating scale of ICF skills to investigate if this measure

was sensitive enough to measure changes in the development of ICF skills. Using the ICF rating scale this research aimed to address the unanswered questions in the evidence base for formulation training by establishing if formulation skills can be improved in novice therapists by attending a formulation training workshop. Due to the highlighted difficulties with using vignettes this study aimed to explore ICF skills in vignette and "live" case formulations. This study also sought to explore the association between ICF diagramming skills and therapist competence and clinical experience.

A final aim was to assess the association between ICF training and clinical outcome using SCED methodology as it is more suitable to formulation due to focusing on individual rather than group outcomes. The IAPT training programme provides an ideal opportunity to examine ICF training as it is an established provider of therapist training in CBT, combining theoretical and experiential learning, within an NHS service provision.

Phase 1. In Phase 1 the participants were trainee CBT therapists who attended a one-day workshop on formulation. Participants were asked to bring along an anonymised formulation of a current case and to create a formulation based on a vignette before receiving the formulation training (based on the ICF approach; Hallam, 2013). After the training, participants were asked to re-formulate the same two cases. The formulation diagrams created by the trainee therapist pre-and-post the workshop were assessed using the ICF rating scale. The participant's competence using the CTS-R and

experience levels were explored in relationship to their demonstrated ICF skills.

Phase 2. This phase prospectively followed participants using an A-B Single-Case Experimental Design (SCED). The 'A' phase refers to the baseline period prior to the formulation workshop and 'B' phase refers to the period after. Broadly speaking, the aim of this phase was to explore whether there was a relationship between the ICF training and the clinical outcome of the training case.

Research questions. This study aims broadly to provide ways of assessing formulation skill to aid the establishment of an evidence base for the reliability and validity of formulation in research settings and in clinical practice. Specifically, this study will aim to:

(a) Develop a measure of ICF skill for use with formulation diagrams and provide initial evidence of its reliability.

Aim 1 (exploratory): to report inter-rater reliability, internal consistency, scale components of the observer rated ICF scale.

(b) This study also aims to provide some initial evidence of the validity of the ICF rating scale by aiming to:

(b1) Establish what formulation skills develop with greater expertise in formulation as reflected by what changes as a function of teaching.

Aim 2 (exploratory): to assess which aspects of formulation skills change (assessed via a ICF checklist) as a result of ICF formulation teaching.

(b2) Explore the relationship between ICF skills, trainee CBT competency and clinical experience, as evidence of concurrent validity.

Hypothesis 1: Participants with greater CBT competence (higher CTS-R scores) and more clinical experience (in years) will demonstrate greater ICF skills as demonstrated on the ICF rating scale.

(b3) Explore the association between ICF training and clinical outcome, as tentative evidence of predictive validity.

Hypothesis 2: Participant's clinical cases will show a greater reduction in outcome (GAD-7 and PHQ-9) from the pre-workshop baseline period to the post workshop period.

Method

Overview

The current study was an initial scale development study. The study also broadly aimed to explore the improvements in formulation skills following a training intervention and the relationship between ICF skills and CBT competence, therapist's experience and therapy outcome.

The current study had two Phases. In Phase 1 a workshop to train trainee therapists in using ICF diagramming conventions was delivered. There were two branches within Phase 1 including a "workshop component" in which participants were invited to formulate a prepared vignette case and a "training case component" where participants were invited to formulate about a client on their existing case load (Figure 1). Pre-post diagrammatic formulations were collected before and after the workshop. Using a sample of the collected formulations, an ICF rating scale was developed to measure ICF diagramming skills. Following this, a preliminary psychometric analysis of the ICF rating scale was conducted. Using the items from the ICF rating scale, an ICF checklist was used to assess what aspects of the diagrams changed from pre- to post workshop. In Phase 2 of the study the relationship between ICF training and clinical outcome was explored using routinely collected outcome measures (Generalised Anxiety Disorder Scale [GAD-7; Spitzer, et al., 2006] and Patient Health Questionnaire-9 [PHQ-9; Kroenke, Spitzer, & Williams, 2001]) from the participant's caseloads.

Design. The study design consisted of several parts. The first part was a reliability analysis (internal consistency, inter-rater reliability and principal components analysis) of the ICF-RS scale using a developmental sample, as this was the first exploration of use the scale. A correlational design was used to assess the concurrent validity of the ICF-RS with trainee's CBT competence (CTS-R) and previous experience in years as the extent to which these variables were associated was of interest for validating the scale and years of clinical experience and CBT competence are variables not best suited to experimental manipulation. The second part of the design was a one-group pre-test post-test design to analyse the proportion of change in formulation skills from before to after the ICF workshop. As this was the initial analysis of the impact of this workshop, a pre-post design was used to give a broad evaluation of the differences that resulted from the workshop. Additional more robust but resource intensive designs involving control groups and randomisation can only be justified once there is evidence that a global effect exists (Barker et al. 2016). Finally, a single experimental case design (SCED) approach was used to assess the impact of the trainee's attendance at the ICF workshop on clinical outcome of their training case. This approach can be described as a SCED approach as this method focuses on a single participant with repeated measurement of outcomes to closely monitor the process of change. The SCED approach used in this study had limitations. Firstly, the study did not have tight controls around the onset of treatment and the timing of the workshop within the treatment, this could have been improved with the use of a multiple base lines approach. Another limitation of the SCED approaches in general is that they have limited generalizability, this study put

further limitations on generalizability with a sample size of only two. Due to these limitations, the findings of the SCED approach should be interpreted cautiously.

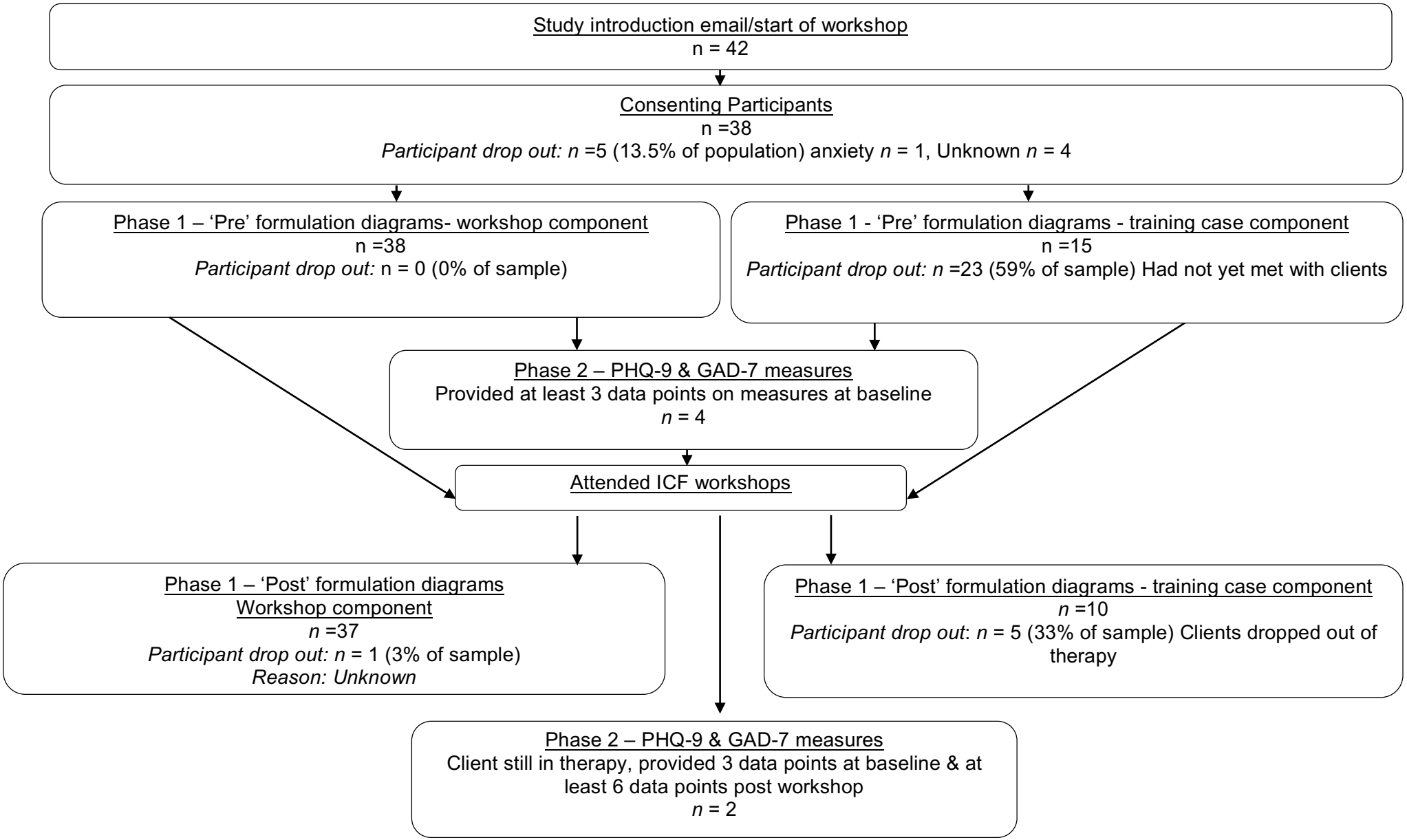

Figure 1. Flow diagram of study procedure and dropout

Participants

Phase 1. The sample of participants consisted of 37 IAPT postgraduate diploma in CBT trainees (30 females and 7 males) with a mean age of 31 (*SD* = 6.3 *range* = 26-56). Entry criteria for the diploma required applicants to have a core mental health profession (e.g., mental health nurse; British Association for Behavioural and Cognitive Psychotherapies; BABCP, 2017a) or have an approved Knowledge Skills and Attitudes Portfolio (BABCP, 2017b; Appendix A). Most participants had previously worked as "low intensity" psychological wellbeing practitioners (PWPs) 76% (*n*=29). The other trainees consisted of two clinical psychologists, one counselling psychologist, one counsellor, one gestalt therapist, one psychodynamic psychotherapist, one systemic family therapist and one drug and alcohol practitioner. All participants were invited to take part in both the workshop and training case component of Phase 1, however, the sample in the training case formulation component of the study was smaller (*n* =10, Figure 1) due to many of the trainees not having their caseloads up and running at the time of the workshop and high levels of client drop out.

Phase 2. The sample for Phase 2 were the participants from the training case component of Phase 1 (*n*=10). For the analysis inclusion criteria were applied that only participants that had provided at least one data point of the routinely collected outcome measures (PHQ-9 & GAD-7) prior to the workshop and completed at least 6 therapy sessions (minimum number of sessions suggested by; NICE, 2016) were included in the pre-post reliable

change in outcome analysis (*n*=5). For the single experimental case design (SCED) the inclusion criteria applied were that only those participants who had collected at least three data points of the routinely collected outcome measures (PHQ-9 & GAD-7) at baseline Phase A (prior to the workshop) (*n* = 4) and 6 points at Phase B after the workshop (reduced to *n* = 2), were included in the analysis. This inclusion criteria were established based on conventions for viable analysis of SCED data (Kazdin, 2010).

Setting. Participants were recruited from the IAPT postgraduate diploma in CBT, also known as the IAPT "high intensity" training course at the London CBT Training Centre. The IAPT diploma in CBT course is accredited by Royal Holloway University, in partnership with local National Health Service (NHS) IAPT service sites.

The IAPT diploma is a year-long training combining weekly academic sessions with clinical supervision and routine clinical practice. The training follows a national curriculum that teaches the IAPT trainees to deliver CBT for common mental health problems such as anxiety and depression (London CBT Training Centre, 2014). Over the duration of their course, trainees receive a minimum of 300 hours of teaching and 35 hours of clinical supervision and must carry out a full course of CBT for a minimum of 8 training cases (Branson, Shafran, & Myles, 2015). The trainees are required to become competent in assessment, formulation and the delivery of treatment protocols in their clinical practice (Centre for Outcomes and Research Effectiveness [CORE], 2017).

The trainees' clinical competencies are routinely assessed by their clinical supervisors using tape recordings and the Cognitive Therapy Rating Scale-Revised (CTS-R; Blackburn et al., 2001) CBT competency rating tool. On successful completion of the course, graduates are eligible for accreditation with the BABCP. Following accreditation, graduates can take posts as IAPT High Intensity CBT Therapists and work as part of stepped care IAPT Services.

Recruitment and retention. Participants were recruited at the London CBT Training Centre with agreement from the course director. The trainees were asked to attend the ICF training workshop as mandatory training in their introductory teaching block. Trainees were contacted two weeks prior to the ICF workshop via email with the details of the workshop (Appendix B). This information included the requirement to bring an anonymised diagrammatic formulation of one of their training cases to the workshop. Electronic copies of the participant information sheet (Appendix C) and the consent form (Appendix D) were included in the initial contact email. This information emphasized that attendance to the workshop was part of their training but participation in the study was voluntary. On the day of the workshop, the study was presented and all participants were given the opportunity to ask questions both as a group and individually during the workshop coffee breaks. Trainees were given hard copies of the participant information sheets to read and an informed consent form to sign.

All but four (88%) of the trainees in the cohort consented to take part in the study. Of those that refused to consent, one trainee cited a reluctance to have their formulations assessed due to anxiety that their formulation skills were not developed enough and the four further trainees did not offer a reason for their refusal to consent. The dropout rate increased as the study progressed (Figure 1), potential reasons for this are offered in the previous IAPT diploma trainees consultation and in the formal trainee feedback.

Sample size. For studies using correlational designs Barker, Pistrang and Elliot (2016) recommend using a beta level of .80 and alpha level .05 to detect a medium effect 0.3, therefore a sample size of 67 is required for the correlational analysis. The correlational analysis in Phase 1 of the study correlating trainee's formulation skill using the ICF-RS score with their clinical experience in years and CBT competence using the CTS-R had a sample size of 37 and is therefore underpowered. It was hoped that more than one training centre would incorporate the ICF workshop to allow for a greater pool of participants, however, space in the training timetable was limited so only one site was able to accommodate the workshop at the time of the study.

Sample size consideration for Phase 2 was based on suggestions from the SCED literature. Shadish, Hedges & Pustejosky, 2014; suggest a minimum of 3 SCED cases, with a minimum of 6 observations per phase to produce power at .80 and Cohen's d of .8. When Cohen's d is lower .5 power is adequate with seven cases with three observations per phase. The required

sample size for the current study was seven cases due to the likelihood of the baseline phase being shorter than six data observations. Unfortunately, the study was underpowered as only two participants were eligible for Phase 2 of the study due to a higher dropout rate than was expected. Shadish et al., (2014) do not advise calculating an effect size for studies with fewer than three cases, therefore the current study was considered a developmental sample.

Research Ethics. Ethical permission to collect data from the IAPT CBT diploma trainees was obtained from the Royal Holloway University of London Ethics Committee via self-certification on 21 July 2016 (Appendix E) and the Health Research Authority on 31 August 2016 (Appendix F).

Consent. Ethical and legal issues are present when using client data in research projects; however, all IAPT CBT diploma trainees are required to get explicit consent from the clients in their training cases that they are aware of their training status and permission to use their anonymised, routinely collected data as part of their learning and supervision. The data assessed in this study was anonymized routinely collected data. The data was analyzed for training purposes to determine if the trainee's attendance at the workshop affected the clinical outcome. The consent forms used for these purposes are stored within the individual IAPT teams to ensure that only anonymised data was passed onto the study team. All information collected after the workshop was sent via the IAPT diploma course staff to ensure that only anonymised

information was passed on.

Confidentiality. Procedures to ensure participant confidentiality and anonymity were devised. Each participant was allocated a unique number, ensuring that all materials related to their participation were anonymised in the analysis and write up. All data were stored in a locked filing cabinet and all computerized data were stored on an encrypted and password protected server. A requirement was made that the study data be securely stored for five years and destroyed after this time. Personal identifying information was stored only in the form of consent forms and was kept separately in a locked cupboard in accordance with British Psychological Society (BPS; 2010) code of human research ethics. A procedure was followed for data to be stored for two years and then destroyed.

Service User Perspective. The research protocol was presented to the IAPT service user group in the North Camden and Islington service to determine its acceptability and explore possible changes. Many of the service users at the group had attended Step Two, or “low intensity,” treatments that involved for example, attending psychoeducation groups and therefore had not had experience of an individual case formulation. These service users felt the formulation approach would help them to feel listened to and to feel like more of an individual. This raises an ethical issue around service users wanting access to different treatments than they felt they were offered. The IAPT services operate a self-referral system and the user group members

have support from staff members from the service around re-engaging with the service if required. For those that had experiences of formulation they felt that they were an important part of their understanding of the course of their treatment. The service users discussed liking being able to take their formulations home. It was also discussed that they found the formulations to be very wordy and to like it when their therapist used images and colours to "brighten up" the diagrams.

The group also raised their dislike of the routinely collected outcome measures within IAPT. They felt that the GAD-7 and PHQ-9 failed to capture the range of their experiences and did not always match up to their views of impairment or improvement/recovery. On the one hand, some service users suggested more direct interviews with participants would be helpful to capture their experiences; on the other hand, others felt that not altering treatment in using routinely collected outcome measures was worthwhile as not everyone was keen on the idea of being interviewed about their therapy experiences. Unfortunately, there was insufficient time to make the necessary ethical amendments to include a qualitative element to the project or include alternative measures such as subjective units of distress into the protocol. This raises a difficulty in terms of the outcome measures not being representative of all elements of service user distress or what they might consider an improved outcome. The outcome measures chosen (PHQ-9 & GAD-7) are from the IAPT minimum data set, whilst it is acknowledged that they do not provide a comprehensive assessment (Department of Health, 2010) these are nationally used measures that are used due to their

accessibly and reliability. The service user lead chairing the meeting, however, agreed to raise the idea of more individualised measures being captured for the service going forward. Overall, the service users were accepting of the protocol.

Previous IAPT diploma Trainee Consultation. A reference group of two previous IAPT diploma trainees also reviewed the proposal, written materials and final project write up. The previous trainees discussed that some of the trainees may not have wanted to consent to the study due to fear of criticism due to the intensity of the start of the course and feeling overwhelmed by all the new information and starting to establish a caseload. To address this, the voluntary nature of study was highlighted in the participant information, the consent form and when meeting with the trainees in person at the workshop. They also fed back that when submitting formulations for their coursework they would often pick “more straightforward” cases to present in formal assessments due to worries about how to represent complexity. The previous IAPT diploma trainees also provided feedback about the demographic information sheet, and that information collected about previous CBT cases should de differentiated between low intensity PWP cases and other CBT cases due to the large volume of clients seen in this setting (Appendix L).

Materials

Phase 1. In Phase 1 participants attended the ICF workshop. There were two branches within Phase 1 including the workshop component and the training case component.

ICF training workshop. A training workshop to convey the skills involved in using the ICF model (Hallam, 2013) was developed by the ICF research team (consisting of Dr Gary Brown project supervisor and Professor Richard Hallam the developer of ICF diagramming conventions [Hallam, 2013] and study collaborator; Appendix G). This training aimed to inform the participants of the ICF model as well as operationalize the conventions of ICF diagramming (Table 2) with illustrated examples and standardize the training received by the trainees. The pre-post formulation diagramming exercises were woven into the training workshop (Table 5).

Case vignette. The vignette formulation exercise gave participants 20 minutes to formulate the case of “Mrs Smith”. Participants were asked to formulate the cases on their own. Professor Richard Hallam developed this vignette using anonymised and adapted case material from his clinical practice (Appendix H).

Table 5. Workshop exercise timeline

Time	Participants task
9:30-9:40	Participants hand in their training case diagrams
9:40-10:00	Completion of initial diagram for vignette case
10:00-4:00	ICF Workshop
4:00-4:20	Participants complete reformulation of vignette case
4:20-4:30	Q&A and closing comments. Participants reminded to submit re-formulation of training case and outcome measures (GAD-7 & PHQ-9).

Formulation forms. Participants were given pre-post formulation exercises as part of both the workshop component and training case component of the study. These exercises allowed for an assessment of the participants acquisition of ICF knowledge and skills during the workshop.

Training case component. Using the pre-workshop training case formulation form (sent via email, Appendix I) participants were invited to give a summary of their training case. All formulations were anonymised but participants were asked to provide the age and gender of the clients in their training case. Participants were asked to provide a diagrammatic formulation (any that they felt appropriate) and explain any symbols that they might use (e.g., single headed arrows to show one thing causing another). The post workshop formulation form (Appendix J) was given at the end of the workshop, and participants were invited to use the ICF model to re-formulate

their cases.

Workshop component. The pre-workshop vignette case formulation form (Appendix K) was given before the start of the workshop alongside the case vignette of Mrs Smith (Appendix H). Participants were asked to formulate using the vignette (in any diagrammatic style that felt appropriate) and explain any symbols used. At the end of the workshop participants were invited to use the ICF model to reformulate Mrs Smith's case using the post workshop formulation form (Appendix J).

Demographic information. The participant's demographic information including age, gender, professional background and previous experience using a demographic information sheet (Appendix L). The data collected were based on demographic information collected in previous research investigating expertise in formulation (Dudley, Ingham, Sowerby, & Freeston, 2015).

Individual Case Formulation Rating Scale (ICF-RS). The ICF-RS was developed for the purposes of this study. The items were generated by the ICF research team. The scale was grounded in the theory of the ICF diagramming conventions (Hallam, 2013; Table 2). The scale was initially developed referring to one of the collected diagrams from the study. The ICF research team then separately rated a subset of five cases, conferred about their ratings, and made modifications to the scale. These five cases were then re-rated along with all the others.

The ICF-RS is a nine-item observation-based rating scale assessing expertise in individual case formulation in formulation diagrams (Appendix M). Table 6 shows a description of each of the items that are based on Hallam's (2013) diagramming conventions (Table 2). Each item is rated on a 0 to 3 scale with higher scores indicating higher levels of competence in the convention. Each diagramming convention is outlined and descriptions are given of the differing levels of skill demonstration (Figure 2). The items when added give a total score, with higher scores indicating higher levels of ICF diagramming competence (range 0-27).

Table 6. Descriptions of the nine ICF-RS items.

ICF-RS rating scale item	Description of item
1	Observations are clear and not confused with explanations
2	Nature and basis for how observations relate to each other is made clear
3	Explanations e.g., hypotheses are included and distinct from observations
4	Key contextual elements are included
5	Functionally equivalent items are outlined
6	Mediators are identified and roles made clear
7	Diagram provides a coherent and comprehensive account of the information
8	Mechanisms of change are outlined
9	Formulation manages complexity successfully

Key contextual elements are included.

The formulation incorporates contextual elements (moderators) such as time, place, others present or absent, emotional state, and other factors relevant to exacerbation or amelioration of an aspect of the problem in terms of its form and frequency of occurrence. Taken together, they provide a useful context for understanding the antecedents of the problem and the circumstances under which it presents itself.

0 – Moderators are not included or their presence does not add explanatory value

1 – Some moderators are included but these are isolated or otherwise provide limited information about how they operate and the circumstances in which the problem can be expected to occur.

2 – Moderators are included that help build a contextual picture of the circumstances in which the problem can be expected to occur and the form it takes, but how they operate is incomplete or unclear in some way.

3 – Moderators are included that play a clear role in the formulation and together help build a comprehensive contextual picture of the circumstances in which the significant aspects of the problem can be expected to occur and what form this takes.

Figure 2. An example Item from the ICF-RS

ICF dichotomous checklist (ICF-DC). The ICF-DC is a nine-item checklist (Appendix N) developed by the author as an abbreviated version of the ICF-RS. The ICF-DC establishes the presence/absence of key ICF skills in the diagrammatic formulations produced by participants. Rating requires assessing the ICF skill domain and rating dichotomously “Present/not present” (Figure 3). A high score is indicative of increased demonstration of ICF diagramming skills. The ICF-DC was used to compare pre- to post diagrams as it was not expected that higher scores on the ICF-RS would be present in diagrams completed before the ICF training.

The problem is clearly defined in terms of how observations inter-relate
The nature and basis for how observations relate to each other is made clear
Present
Absent

Figure 3. An example Item from the ICF-DC

The Cognitive Therapy Scale- Revised (CTS-R). The CTS-R (Blackburn et al. 2001; Appendix O) builds on the CTS (Young & Beck, 1980). The CTS-R is a 12-item observer-rated scale that is used to measure trans-diagnostic cognitive therapy competence across different competence domains.

The CTS-R is rated on a 0 (incompetence) to 6 (expert) Likert scale (Figure 4). The CTS-R gives a total score, with higher scores indicating higher levels of competence (range 0-72). A validated competency level has not been established, however, a score of 36 is considered a minimum standard (James, Blackburn & Reichelt, 2001). This cut off is, however, arbitrary and was set for the previous CTS versions and has not yet been validated for the CTS-R (Muse & McManus, 2013). The CTS-R demonstrates respectable internal consistency (α range=.75–.97; Blackburn et al., 2001; James et al. 2001; Reichelt et al., 2003). The inter-rater reliability of the CTS-R ranges from moderate without rater training (r=.44) to good following rater training (r=.67; Reichelt et al., 2003). The CTS-R is also sensitive to change and can

detect varying levels of skills in therapists (Blackburn et al. 2001).

ITEM 1 – AGENDA SETTING AND ADHERENCE

Competence level	Examples
0	No agenda set, highly inappropriate agenda set, or agenda not adhered to.
1	Inappropriate agenda set (eg. lack of focus, unrealistic, no account of patient's presentation, homework not reviewed.
2	An attempt at an agenda made, but major difficulties evidence (eg. Unilaterally set). Poor adherence.
3	Appropriate agenda, which was set well, but some difficulties evident (eg. Poor collaboration). Some adherence.
4	Appropriate agenda, minor difficulties evident (eg. no prioritization), but appropriate features covered (eg. review of homework). Moderate adherence.
5	Appropriate agenda set with discrete and prioritized targets – review at the end. Agenda adhered to. Minimal problems.
6	Excellent agenda set, or highly effective agenda set in the face of difficulties.

Figure 4. An example Item from the ICF-RS

A review of methods of assessing competence in CBT found that no one method has been found to comprehensively assess CBT competence (Muse & McManus, 2013), despite its limitations the CTS-R is the most widely used tool for measuring CBT competence with adults (Rakovshik & McManus, 2010). All participants had a recorded tape of one of their training cases rated by their supervisor using the CTS-R as part of their usual training procedures.

Workshop feedback form. Anonymous feedback about lectures/workshops is routinely collected by the London CBT Training Centre course staff. The workshop feedback form (Appendix P) captures both quantitative and qualitative feedback from trainees regarding their training sessions.

Phase 2. The outcome measures collected in Phase 2 are the routinely collected outcome measures in IAPT settings (National Health Service, 2008). This allowed the participants to provide the same outcome measures despite being in different IAPT services.

Generalized Anxiety Disorder Scale (GAD-7). The GAD-7 (Spitzer, et al., 2006; Appendix Q) is a seven-item self-report scale that measures the severity of Generalized Anxiety Disorder (GAD) in adults in primary care settings (Löwe et al. 2008). It has also been found to measure symptoms of panic disorder, social anxiety disorder and post-traumatic stress disorder moderately well (Kronke et al. 2007). The GAD-7 is measured on a 0 (not at all) to 3 (Nearly every day) point Likert scale to give a total score (range 0-21), with higher scores indicating higher level of generalised anxiety (Figure 5).

Over the past 2 weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious or on edge	0	1	2	3

Figure 5. An example item from the GAD-7

The GAD-7 is used for screening and monitoring the severity of generalised anxiety. Cut off points of 5, 10 and 15 represent mild, moderate, and severe levels of anxiety symptoms (Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). The GAD-7 has demonstrated respectable internal consistency (*a* range =.79- .89; Dear et al. 2011 & Löwe et al. 2008). Test-retest reliability using intra-class correlation was good (.83) in a sample of 591 primary care patients; however, the period of this analysis was not reported (Spitzer et al., 2006). Whilst the GAD-7 was not designed to discriminate between psychiatric diagnosis research has found that patients with an anxiety disorder (GAD, post-traumatic stress disorder, panic disorder and social anxiety disorder) scored significantly higher on the GAD-7 than patients without those anxiety disorders $t(1,080)= 11.32$, $p < .001$ (Beard & Bjorgvinsson, 2014).

Patient Health Questionnaire (PHQ-9). The PHQ-9 (Kroenke, Spitzer, & Williams, 2001; Appendix R) is a nine item self-report scale of the nine DSM-IV (APA, 2000) criteria for depression in adults. The PHQ-9 is measured on a 0 (not at all) to 3 (nearly every day) Likert style scale to give a total score

(range 0-27), with higher scores indicating higher levels of depression (Figure 6).

Over the past 2 weeks, how often have you been bothered by any of the following problems?	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
Little or no interest in doing things	0	1	2	3

Figure 6. An example item from the PHQ-9

The PHQ-9 can be used as part of making a diagnosis or used repeatedly to reflect improvement or worsening of depression in response to treatment (Blackwell & McDermott, 2014). Cut off points of 5, 10, 15 and 20 represent mild, moderate, moderately severe and severe levels of depressive symptoms (Kroenke, Spitzer, Williams, & Löwe, 2010).

Cut off points, however, appear somewhat arbitrary as in IAPT settings a score of nine or above on the PHQ-9 is considered to indicate clinically significant symptoms of depression (IAPT, 2011). The PHQ-9 has been found to be both reliable and valid in the recognition of depression within primary care (IAPT, 2011); for example, it demonstrated respectable internal consistency (*a*=.80) in 405 depressed patients referred by primary care physicians (Lee et al., 2007). Test-retest reliability based on a 48-hour period was also reported to be excellent with a kappa of .84 indicating good stability over time (Kroenke, Spitzer & Williams, 2001). The PHQ-9 was found to discriminate well between people with and without major depression and a

strong relationship was found between the PHQ-9 and other constructs related to depression, such as functional status and disability days (Kroenke et al., 2001). The PHQ-9 is only a screening tool, and meta-analysis has revealed that it is not sufficient for use as a stand-alone measure to confirm a depression diagnosis; it is, however, a widely used, quick, no cost measure that can monitor severity of symptoms over time (Blackwell & McDermott, 2014).

Procedure

Phase 1 - ICF training workshop and formulation exercises. Phase 1 of the study involved the collection of pre- to post data for both the workshop component and training case component. The ICF training workshop was delivered to participants to explore the research aim of assessing ICF skills that change as a result of training.

Workshop component. The vignette formulation exercises were woven into the workshop as part of the training (Table 7). Participants were presented with the case of Mrs Smith (Appendix H) at the start of the ICF workshops. Participants were given the pre-vignette case formulation form (Appendix K) and asked to provide a diagrammatic formulation in any form they felt appropriate. At the end of the workshop day they were asked to reformulate the case Mrs Smith using the ICF model on post workshop formulation forms (Appendix J). At the close of the workshop an example of an ICF formulation of Mrs Smith was given and participants were given the

opportunity to ask questions.

Table 7. Participant Itinerary

Timing	Actions
Email to trainees	Present study to IAPT trainees Distribute participant information sheets and consent forms Distribute pre-workshop training case formulation form
Pre ICF Workshop	Collect consent forms for those participating in the research Collect pre-workshop training case formulation form Collect demographic data Participants formulate Mrs Smith on pre-vignette case formulation form
Post ICF Workshop	Participants complete post workshop formulation form for Mrs Smith Anonymous workshop feedback form completed For those that provided pre-post training case formulations PHQ-9 and GAD-7 scores are collected All participants have CTS-R assessment

Training case component. Participants were initially contacted via email two weeks prior to the workshop (Appendix B) and were given the pre-workshop training formulation form (Appendix I). They were asked to provide a formulation of their case using this form and bring it to the ICF workshop. This was collected before the start of the workshop. After attending the ICF training workshop, participants were given the post workshop formulation form

(Appendix J) and were given two weeks to reformulate the case and return it to the author via the IAPT CBT diploma course team. The training case component of the study was intended to address the problems of ecological validity with the case vignette method (Dudley et al., 2010) by allowing trainees to formulate about a client that they had assessed. With the training case formulations, participants were free to research, seek supervision and obtain more information from the client in the two weeks following the workshop.

Supervisor ratings of overall CBT skills. All trainees had an audio recorded therapy session rated by their supervisors using the CTS-R. This was part of their IAPT diploma training and was scheduled around four weeks after the ICF training workshop. To give an estimate of overall CBT competence all consenting participants had their overall CTS-R scores forwarded to the author via the IAPT diploma course staff.

Observer rating of ICF diagramming skill. The workshop component pre- and post diagrams were rated using the ICF-DC to explore changes in formulation skills following the ICF workshop. The pre-workshop formulation diagrams were rated directly using the ICF-DC by the author. The post ratings were computed from the aggregated ICF-RS scores from the rating pool (See below). Post scores on the ICF-RS were dichotomised, with items scoring 0 on the ICF-RS being marked as “absent” and any items >0 being marked as “present”. A sample of 25% (*n*=12) of the pre-diagrams (as

recommended by Cone & Foster, 2011) were rated by Alicia Griffith (DClinPsy trainee also familiar with the ICF model). The 12 diagrams that were double rated were chosen at random (Urbaniak & Plous, 2015).

The post workshop diagrams were rated using the ICF-RS. Only the post ratings were assessed with the ICF-RS as it was felt that prior to the workshop participants' diagrams would be unlikely to demonstrate high levels of formulation skill and that pre-post change would be best captured by the checklist approach. Each post diagram was rated twice by raters drawn from a three-rater pool. This rater pool included that ICF research team and Dr Inês Mendes a study collaborator familiar with the ICF model.

Phase 2 - Exploration of outcome. In Phase 2 the routinely completed session-by-session measures of PHQ-9 and GAD-7 were collected for those that had submitted pre-post training case formulations. These measures were collected on paper or online depending on the client's preference as part of the usual IAPT service delivery model. Anonymised scores were forwarded to the principal researcher via the IAPT diploma staff team. The study aimed to follow the participant's clinical cases before and after the ICF training, with minimal disruption to routine treatment.

Results

Overview

There were multiple analyses carried out on different samples in this study, including the workshop component, training case component, and analyses for those whose outcome data meet the criteria for single case experimental design. These analyses are summarised in Table 8.

Inter-rater Reliability

ICF-DC. A random sample of 25% (as recommended by Cone & Foster, 2011) of the training cases and workshop component pre-formulation diagrams were double rated using the ICF-DC. As this measure was dichotomous, inter-rater reliability was established using Cohen's Kappa. Cohen's Kappa is preferable to percentage agreements as it takes into consideration chance level agreement (Barker et al., 2016). The guidelines presented in Table 9 were used to assess the extent of the inter-rater reliability for the ICF-DC.

Table 8. Summary of analysis carried out

Psychometric property	Sample (*n*)	Statistical test
Inter-rater reliability	Blind rated post workshop component diagrams (*37*) Pre-workshop component (25% of sample =*12*)	Intra-class correlation coefficients (ICF-RS) Cohen's Kappa (ICF-DS)
Internal consistency	Blind rated post workshop component diagrams (*37*)	Cronbach's α & Inter-item correlations
Scale Components	Blind rated post workshop component diagrams (*37*)	Principal Components analysis
Training Impact of the workshop	Pre-post workshop component (37)	McNemar statistic
Concurrent validity	Pre-workshop component & training case component (*47)*	Pearson's correlation coefficient / Spearman's rank correlation coefficient
Predictive validity	Pre-post training case component that met criteria (*5*) SCED participants (*2*)	Reliable change index SCED Graph visual analysis TAU-U

Table 9. Kappa Coefficient Guidelines (Landis & Koch, 1977)

Kappa	Level of agreement
0.01	Poor
0.01-0.20	Slight
0.21-0.40	Fair
0.41-0.60	Moderate
0.61-0.80	Substantial
0.81-1.00	Almost perfect

ICF-RS*.* The post workshop component diagrams were blindly rated using the ICF-RS. Each diagram was rated twice by raters drawn from a three-rater pool. As is customary when not all raters rate every participant, estimates of inter-rater reliability were calculated using one-way random Intra-class correlation coefficients (ICC's; Landers, 2015). ICC's are considered the "gold standard" approach to examining inter-rater reliability (Shrout & Fleiss, 1979). ICC's are more suitable than Pearson´s correlations when several judges rate the same targets and where assignment of raters is arbitrary (Shrout & Fleiss,

1979). ICC's can be used to assess how good a rating system is and show which dimensions show reliability problems (Barker et al., 2016). The guidelines for assessing "good" reliability in ICC's is suggested by the Kings

College London statistics advisory service (2017) to be the same criteria suggested for levels of agreement in Kappa scores (Table 9).

Internal Consistency

Internal consistency of the blindly rated aggregated ICF-RS scores on the post workshop component diagrams was examined by calculating Cronbach's alpha (α). This inter-item reliability score is obtained by calculating correlations amongst individual items of the scale (Barker et al., 2016). This was used to determine the degree to which items assess the same underlying construct within the ICF rating scale. Cronbach's alpha ranges from 0 = items independent to 1 = items identical. Conventions suggest that alpha scores below .60 are unacceptable; between .60 and .65 are undesirable; between .65 and .70 are minimally acceptable; between .70 and .80 are respectable (DeVellis, 2012).

Scale Components

The alpha coefficient alone cannot guarantee that all items of a scale underlie one single latent variable, and factor analysis is suggested to determine the underlying constructs of a set of items (DeVellis, 2012). Factor analysis was beyond the scope of this scale development study, because a sample of about five to ten subjects per item is required (between 45 - 90 participants; DeVellis, 2012). However, a principal component analysis (PCA) was conducted on the ICF-RS scores for the post workshop component diagrams. An adequate sample size for a PCA is suggested by Comfry and Lee (1992)

to be “evaluated very roughly on the following scale 50 - very poor; 100 –poor; 200 –fair; 300 – good; 500 – very good; 1000 or more excellent” (p.217). Another rule of thumb from a review of several studies suggests a minimum sample size of 50 (Guadagnoli & Velicer, 1988). The current study sample size was small (N=37) and below these suggested limits, therefore an assessment of the suitability of the sample size using Bartlett’s test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were used. The Bartlett’s test of sphericity needs to be significant ($p < .05$) and the KMO measure of sampling adequacy needs to be above .6 for the PCA analysis to be considered appropriate (Field, 2009). The second part of the PCA establishes which linear components exist within the data and how a variable might contribute to that component. In PCA, those factors that have an eigenvalue of larger than one should be considered important factors (Kaiser, 1960); this criterion, in conjunction with analysis of the scree plot, can aid decisions about the number of underlying factors (Field, 2009). Some claim that the solutions generated from a PCA have little difference from those using the factor analysis technique (Guadagnoli & Velicer, 1988). There is, however, disagreement about this as others claim that PCA is a far more inferior way to assess factors (Field, 2009); therefore, results shall be interpreted cautiously.

Concurrent Validity

Concurrent criterion validity was assessed between ICF formulation skills as measured by the ICF-RS and participants’ CBT competence as measured by the supervisor rated CTS-R. The association between ICF skills and

participant's clinical experience in years was also assessed. These associations were assessed using Pearson's correlation coefficient when the data met parametric assumptions. If data did not meet parametric assumptions, a Spearman's rho correlation was used. The coefficient score lies between -1 and +1, coefficient values of plus or minus ±.1 represent a small effect, ±.3 a medium effect and ±.5 a large effect (Field, 2009). Using coefficients, the relationship between formulation skills and CBT competence can be explored, however, causation cannot be implied.

Training Impact of the Workshop

To explore changes in formulation skills following the ICF workshop, changes in pre-post diagrams were rated using the ICF-DC. The pre-ratings were assessed directly with the ICF-DC as rated by the author, whilst the post ratings were computed from the aggregated ICF-RS scores from the rating pool. Post scores on the ICF-RS were dichotomised, with Items scoring 0 on the ICF-RS being marked as "absent" and any items >0 being marked as "present". The ICF skills demonstrated were compared from pre- to post-workshop in both the workshop and training case component. The McNemar statistic was used as it is suitable for comparing dichotomous variables using a repeated measures design (Pett, 2016). The McNemar statistic shows significance in a shift in proportion and was used to determine which ICF diagramming skills were learnt in the workshop.

Predictive Validity

To establish if the therapy delivered by participants represented reliable clinical change, the reliable change index (RCI; Jacobson & Truax, 1991) was used as a statistical approach to clinical significance of the pre-post GAD-7 and PHQ-9 measures. Only those participants that had delivered at least six sessions of therapy (minimum number of sessions suggested by; NICE, 2016) were included in the analysis. The RCI considers error variance in evaluating the magnitude of the observed change and provides a basis for assessing clinical significance (Zahra & Hedge, 2010). Jacobsen and Truax (1991) suggest that cut off points for clinically significant changes should be obtained by using a reliability change index. Calculating a cut-off point using the RCI involves assessing if the post-intervention score is closer to the mean of the "functional" population than it is to the "dysfunctional" population (Appendix S). The data used in the analysis for "functional" population scores were *M* = 2.95, *SD* = 3.41 (Löwe et al, 2008) for the GAD-7 and *M* = 2.9, *SD* = 3.5 for the PHQ-9 (Kocalevent, Hinz, & Brähler, 2013). The data used for the "dysfunctional" population was *M* = 12.59 *SD* = 3.96 for the GAD-7 (Dear et al., 2011) and *M* = 18.4 *SD* = 3.6 (Lee et al., 2007) for the PHQ-9. The implemented criterion suggested by Jacobsen and Truax (1991) was that the post intervention scores must be two standard deviations or more away from the mean of the "dysfunctional population" in the direction of the "functional population" to establish clinical significance. Morley and Dowzer's (2014) manual for calculating the RCI was used to analyse the data.

Association between ICF skills and clinical outcomes

To explore the association between ICF training and clinical outcome, an A-B single case experimental design (SCED) was applied to the routinely collected clinical outcome data (PHQ-9 and GAD-7) for participants (*n*=2) in Phase 2. The 'A' phase of the SCED referred to the baseline period prior to the formulation workshop and 'B' phase referred the post ICF workshop period. It is common with SCED to reach a judgement about reliable intervention effects through reviewing the graphs (Morley, 2015). The aim of visual analysis is to decide whether the pattern of data in intervention B phase differs from the prior baseline A phase (Kratchowill, 2010). The initial step is to determine whether the baseline phase is a consistent enough basis in relation to which intervention effects can be judged. Next, level, trend and variability of data is assessed within each phase, and the observed patterns across phases are compared to evaluate the evidence that changes across phases can be established (Morley, 2015). However, there is debate in the literature about whether visual analysis of SCED graphs is sufficient (Morley, 2015) or whether statistical analysis is necessary (Kazdin, 2010). Statistical analysis of SCED data may be called for beyond visual analysis in cases where baseline data are unstable (Morley, 2015). In cases of baseline instability, overlap between the A and B phase can be assessed using the Tau-U statistic (Parker, Vannest, Davis, & Sauber, 2011).

A data analysis plan was established based on Morley's (2015) recommendations for visual and statistical analysis in SCED data. Definitions of key terminology used in this section can be found in Table 10. Central

tendency, trend and variability were plotted for the GAD-7 and PHQ-9 scores for both participants of Phase 2 (Participant 39 and Participant 41). Various methods were used in the calculation of these parameters depending on phase length (Morley, 2015). Table 11 describes the methods used and their presentation within the graphs, and phases are separated by vertical solid lines. According to Gast and Spriggs (2010), baseline stability can be assumed when 80% of the phase data falls within a 20% range of the median. Due to the small number of data points available, a conservative approach to baseline stability was used, with stability being assumed only when all phase data points fell within a 20% range of the median. Tau-U analysis was used to check for trends in the baseline phase (Parker et al., 2011). Tau-U analysis was also carried out as a measure of significant non-overlap between the A and B phases (Parker et al., 2011).

Trainee feedback

The trainees' quantitative and qualitative feedback using was collected using the workshop feedback from (Appendix P) and the general findings are presented. Data were collected anonymously, it may include trainees who were not participants in the study as it was collected from the whole ICF workshop group population (*n*=42).

Table 10. Terminology used in graphical analysis

Terminology	Description	Use
Median	The number in the middle of the data set. This number is determined by rank ordering the data and choosing the middle value. In the case of an even number of data points the median is estimated using the average of the middle two data points.	The median is often a more useful measure of central tendency than the mean in SCED.
Broadened Median (Bmed)	The average of the three middle values when data are rank ordered.	The Bmed is a more robust estimator of the number in the middle of the data when data are rank ordered than the median.
Running Mean of 2 (RM2)	Average of successive sets of two data points throughout the phase.	RM2 gives representation of the trend by 'smoothing data'
Trimmed Range	Lines connecting the highest and lowest values in each half of the phase that depict changes in variability across time.	The trimmed range is used to assess overlap in data sets $n<15$

Table 11. Graphical representation of methods used in analysis

Measures of Central Tenancy within Phase – Dashed Line		
Phase length	**Method used**	**Graphically Represented by**
2-5	Median	Dashed Line
5+	Broadened Median (BMed)	Dashed Line
Trend within Phase – Solid Black line		
Phase Length	**Method used**	**Graphically Represented by**
Any	Running Mean of 2 (RM2)	Thick Black Line
Variability within Phase – Dotted line		
Phase Length	**Method used**	**Graphically Represented by**
Any	Trimmed Range	Dotted Line

Study Results

Demographic characteristics. Table 12 shows the demographic baseline characteristics of participants. In general, the study sample was fairly novice, with very few having previous experience of CBT outside of a low intensity IAPT context. The mean scores for the CTS-R across samples was also either just over or just under the minimum suggested cut off for competence of 36 (James, Blackburn & Reichelt, 2001).

Table 12. Demographic Information for participants

Demographic information	Workshop component (*n* = 37)	Training case component (*n* = 10)	Training cases that provided outcome data (*n* = 5)	Provided sufficient baseline data for SCED (*n* = 2)
Age (Years)				
Range	26-56	26 – 32	26 – 32	26-32
Mean (SD)	31 (6.3)	28 (1.9)	28 (2.5)	29 (4.2)
Gender				
Male (%)	7 (19%)	3 (30%)	1 (20%)	-
Female (%)	30 (81%)	7 (70%)	4 (80%)	2 (100%)
Core Profession				
PWP (%)	28 (76%)	8 (80%)	4 (80%)	2 (100%)
Other (%)	9 (24%)	2 (20%)	1 (20%)	-
	See method **section**	Counselling psychologist, Systemic family therapist	Systemic family therapist	
Previous Clinical Experience (Years)				
Range	1.5 – 10	2.5 – 7	3-7	3
Mean (SD)	4 (2)	4 (1.4)	4.2 (1.6)	3 (0)

N previous CBT cases				
Low Intensity CBT				
Range	0 - 600	0 – 400	100 - 376	100 – 376
Mean (SD)	232.8 (171.1)	200.5 (154.9)	195.2 (133.1)	238 (195.2)
Other CBT Models	5-100			
Range	6.1 (20.1)	0-15	-	-
Mean (SD)		1.4 (4.5)	-	-
Higher education (Years)				
Range	3 – 13	3 – 5	3 – 5	4 – 5
Mean (SD)	4.4 (2.3)	3.7 (0.9)	4.4 (.9)	4.5 (.7)
CTS-R score				
Range	27 - 47	29 – 43	34 -43	36-36
Mean (SD)	35 (5.02)	35.9 (3.61)	37.6 (3.38)	36 (0)

Reliability. Inter-rater reliability was evaluated for the ICF-DC and ICF-RS. Internal consistency of the ICF-RS was also evaluated.

ICF-DC. Cohen's Kappa statistics were calculated to assess the inter-rater reliability of the ICF-DC score on the pre-workshop component diagrams. The kappa statistics in Table 13 show a range of inter-rater reliability scores from .17 to 1 demonstrating fair to almost perfect agreement.

These findings indicate that scores on ICF-DC Items 1 and 2 are substantially reliable, suggesting that raters could reliably assess how well the formulation diagrams represented observations and the basis of how observations were related to each other. Items 7 and 9 showed only slight inter-rater reliability; these items refer to the extent to which the formulation was coherent and comprehensive and the extent to which the formulation manages complexity. All the other items show fair to moderate inter-rater reliability.

Table 13. Crosstab of Rater 1 and Rater 2 for the ICF-DC

ICF-DC Item number	Rater 2 (DP)	Rater 1 (AG)			Kappa statistic	Significance level
		Present	Absent	Total		
Item 1	Absent	0	5	5		
	Present	7	0	7		
	Total	7	5	12	1	<.001
Item 2	Absent	1	3	4		
	Present	8	0	8		
	Total	9	3	12	.80	<.001
Item 3	Absent	3	2	5		
	Present	7	0	7		

	Total	10	2	12	.44	.07
Item 4	Absent	0	6	6		
	Present	2	4	6		
	Total	2	10	12	.33	.07
Item 5	Absent	3	3	6		
	Present	5	1	6		
	Total	8	4	12	.33	.22
Item 6	Absent	1	3	4		
	Present	5	3	8		
	Total	6	6	12	.33	.22
Item 7	Absent	2	4	6		
	Present	3	3	6		
	Total	5	7	12	.17	.56
Item 8	Absent	0	4	4		
	Present	5	3	8		
	Total				.53	.04

		5	7	12		
Item 9	Absent	2	8	10		
	Present	1	1	2		
	Total	3	9	12	.25	.37

ICF-RS. Intra-class correlations were calculated to assess the inter-rater reliability of the ICF-RS for the individual items and total scale (Table 14). The ICC's show a range from .14 to .69 showing that the items range from slight to substantial agreement (Landis & Koch, 1977). The reliability of the ICF-RS total score shows moderate (.57) inter-rater reliability. The ICF-RS scores from Item 8 should not be interpreted as it has poor inter-rater reliability. For the other items, the interpretation should be cautious as reliability varies. The ICF-RS requires further development to bring some of the less reliable items in line with the items showing substantial reliability.

Table 14. Intra-class correlations for the ICF-RS

ICF-RS rating scale item	Description of item	ICC
1	Observations are clear and not confused with explanations	.57
2	Nature and basis for how observations relate to each other is made clear	.54
3	Explanations e.g. hypotheses are included and distinct from observations	.33
4	Key contextual elements are included	.36
5	Functionally equivalent items are outlined	.69
6	Mediators are identified and roles made clear	.14
7	Diagram provides a coherent and comprehensive account of the information	.62
8	Mechanisms of change are outlined	*
9	Formulation manages complexity successfully	.66
Total		.57

*Statistic could not be calculated.

Internal consistency. A Cronbach's alpha score of .91 on the ICF-RS post workshop component diagrams suggesting a respectable level of internal consistency (DeVellis, 2012). The mean item total correlation was .71.

Principal component analysis. A principal component analysis (PCA)

was conducted on the nine ICF-RS items with orthogonal rotation (Varimax). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis *KMO* = .89 ("good" according to Field, 2009). The Bartlett's test of sphericity $x^2(36) = 236.80$, p <.001, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component of the data. Two components had eigenvaules over one, however, one factor had a large eigenvalue of 5.63 explaining 63% of the variance. Using this large value and the inflection point on the scree plot (Appendix T) one underlying factor of the ICF-RS can tentatively be assumed.

Validity. Validity of the ICF-DC was demonstrated by its ability to reflect changes in the skills acquired at the ICF workshop. The ICF-RS was assessed further in terms of its concurrent validity when compared to participant's CTR-S scores and years of clinical experience. The predictive validity of the workshop in improving outcome was tentatively explored using the RCI analysis and pre-post workshop changes in outcome measures using the SCED analysis.

Training impact of the workshop. The McNemar statistic was used to assess the change in proportion of ICF skill present in participant's diagrams from pre- to post the ICF workshop in the workshop component of the study (Table 15). The total proportion of ICF skills significantly increased after the ICF workshop. All skills showed significant improvement after the workshop

apart from Items 3, 6 and 8, implying that most of the ICF skills have been learnt in the workshop. Items 6 and 8 represent the skills of demonstrating mediators and mechanisms of change, these items were not able to give significant results as these features were present in 100% of the post diagrams. Item 3,

representing depiction of hypotheses, did not show significant change from pre- to post and this item showed fair reliability in the inter-rater analysis so this feature warrants further consideration.

Table 15. Pre-to-post change in the ICF-DC

ICF-DC item	Item status	Workshop component		McNemar significance level
		Pre	Post	
1	Present	62.2%	94.6%	.002
	Absent	37.8%	5.4%	
2	Present	62.2%	94.6%	.002
	Absent	37.8%	5.4%	
3	Present	62.2%	81.1%	.118
	Absent	37.8%	18.9%	
4	Present	35.1%	91.8%	<.001
	Absent	64.9%	8.1%	
5	Present	45.9%	73%	.041
	Absent	54.1%	27%	
6	Present	67.6%	100%	*

	Absent	32.4%	-	
7	Present	45.9%	86.5%	.001
	Absent	54.1%	13.5%	
8	Present	62.2%	100%	*
	Absent	37.8%	-	
9	Present	21.6%	83.8%	<.001
	Absent	78.4%	16.2%	
Total	Present	51.7%	89.5%	<.001
	Absent	48.3%	10.5%	

*Could not compute statistic

Concurrent Validity of the ICF-RS. The ICF-RS scores were normally distributed with non-significant skew ($z = 0.68$, $p = ns$) and non-significant kurtosis ($z = 0.53$, $p = ns$).

CBT Competence. Participants' competence in CBT as measured by the CTS-R was normally distributed with non-significant skew ($z = 1.78$, $p = n.s.$) and non-significant kurtosis ($z = 0.64$, $p = n.s.$). The association between participant's CBT competence and ICF-RS was therefore measured using the Pearson's Correlation Coefficient. A "poor" negative non-significant association was found between CTS-R score and ICF-RS score (r (37) = -.06, p = ns), .36% variance was shared between the two variables.

Clinical Experience (years). Participant's clinical experience was not normally distributed as it showed significant positive skew (z = 4.74, p > .05) and kurtosis in the normal range (z = 2.14, p = n.s.) therefore, a Spearman's rank-order correlation was run to determine the relationship between participant's clinical experience in years and their ICF-RS rating score. A slight negative non-significant association was found between clinical experience in years and ICF-RS score (r (47) = -.05 p = n.s.), .25% variance was shared between the two variables. For comparison, a Spearman's rank-order correlation was run to determine the relationship between clinical experience in years and CTS-R score. A non-significant slight positive relationship was found between the two variables (r (47) = .255 p = n.s.), 6.5% variance was shared between the two variables.

Predictive validity. The reliable change index (Jacobson and Truax, 1991) was used to take a statistical approach to clinical significance of the therapy undertaken by the workshop participants.

GAD-7. The reliable change index (RCI) for the GAD-7 was 2.48 (*SE* = 0.89). This indicated that of the five eligible participants, one of their training cases had reliably deteriorated and four had reliably improved (Figure 7). Table 14 shows that, apart from Participant 3 whose case deteriorated, all the others had also moved to a lower descriptive category of the GAD-7 (Kroenke et al.,2007).

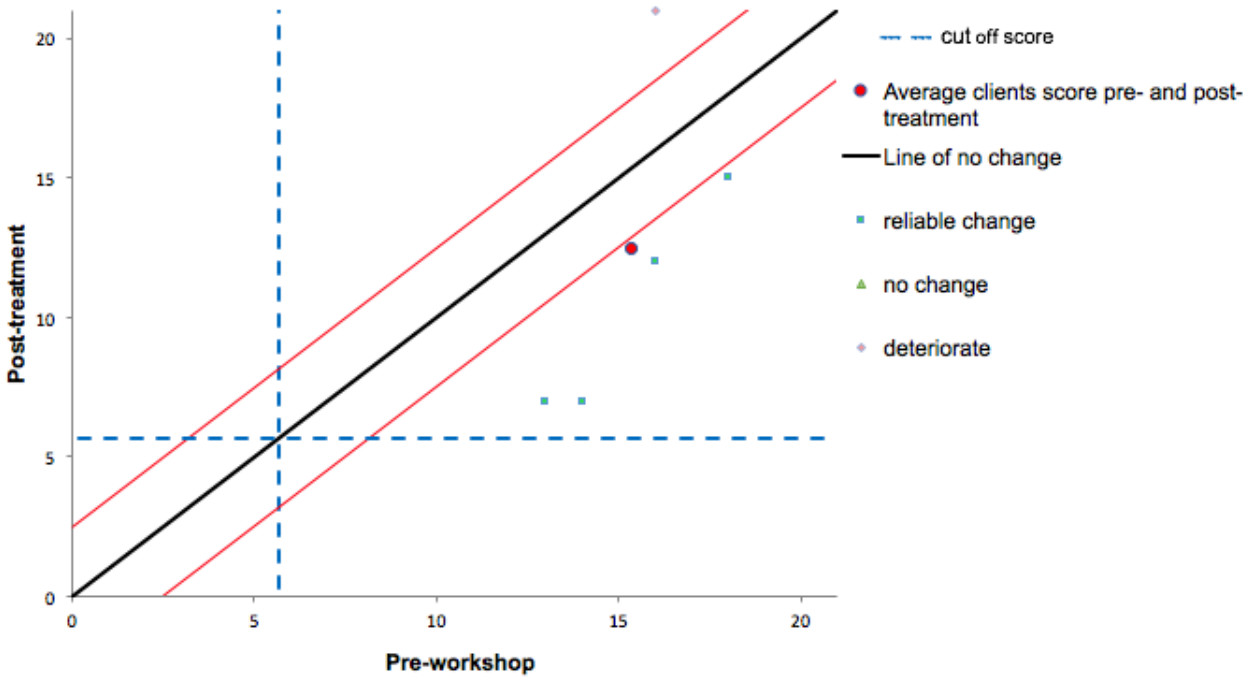

Figure 7. Reliable Change Index for GAD-7

Table 16. GAD-7 scores for participants before the workshop and after treatment

	GAD-7	
	Pre ICF workshop session	End of treatment
P3	16 (Severe)	21 (Severe)
P14	18 (Severe)	15 (Moderate)
P18	14 (Moderate)	7 (Mild)
P39*	13 (Moderate)	7 (Mild)
P41*	16 (Severe)	12 (Moderate)

**Participants in the SCED analysis*

PHQ-9. The RCI for the PHQ-9 was 5.71 (*SE*=2.06). This indicated that, of the five eligible participants, four of their training cases had not changed and one had reliably changed (Figure 8). Table 17 shows that Participant 18 and Participant 39 had moved into a lower descriptive category on the PHQ-9 (Kroenke et al., 2010).

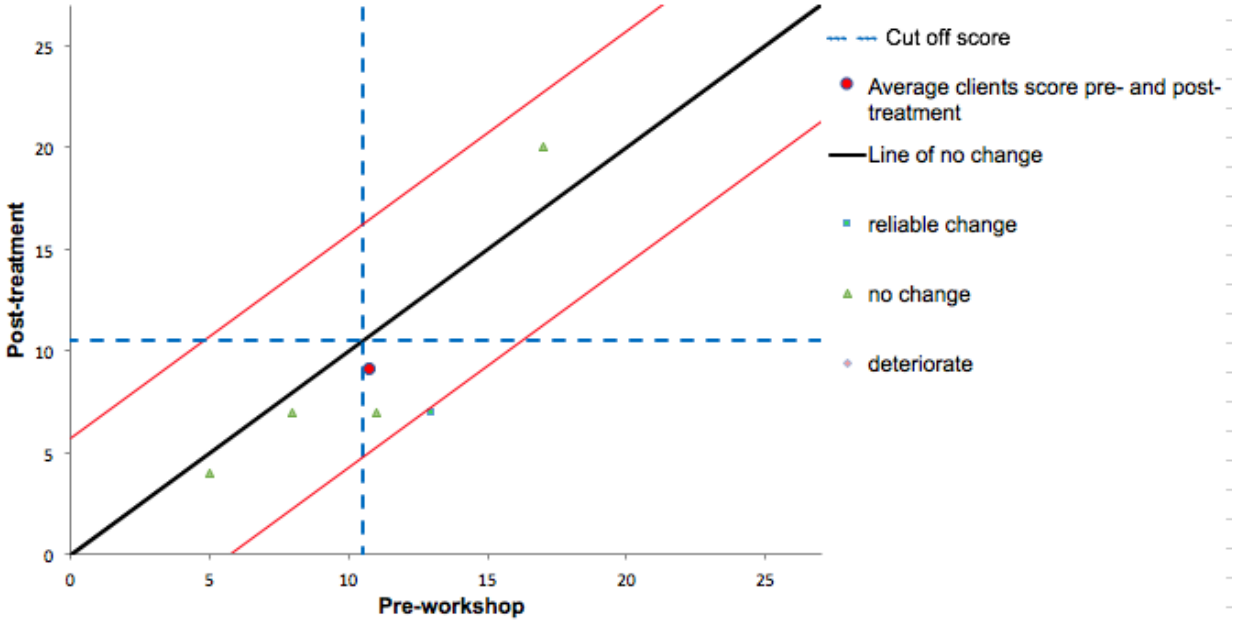

Figure 8. Reliable Change Index for PHQ-9

Table 17. PHQ-9 scores for participants before the workshop and after treatment

	PHQ-9	
	Pre ICF workshop session	End of treatment
P3	17 (Moderately severe)	20 (Severe)
P14	5 (Sub clinical)	4 (Sub clinical)
P18	11 (Moderate)	7 (Mild)
P39*	8 (Mild)	7 (Mild)
P41*	13 (Moderate)	7 (Mild)

**Participants in the SCED analysis*

Association of ICF skills and Outcome. The association between the ICF workshop and clinical outcome was investigated using a SCED analysis to explore the timing of change in outcomes relative to the formulation workshop on weekly outcome measures reported by the clients being seen by the participants in weekly therapy.

Participant 39. Participant 39 met for CBT with a female client aged 33 presenting with social anxiety. Four baseline points were collected before Participant 39 attended ICF training. Pre-treatment anxiety was severe, which reduced to mild anxiety and was deemed a reliable change by the RCI analysis.

The baseline data gathered for the GAD-7 was stable, as it was within a 20% range of the median. The visual analysis indicated a slight negative trend in the baseline, however the Tau-U statistic confirmed that this trend was non-significant *TAU*= -.83 (*p* = *n.s.*), 90% Confidence Interval (CI): -1< >.03, therefore visual inspection of data across phases was appropriate. The central tendency measure appears lower for the GAD-7 scores for Phase B relative to Phase A (Figure 9). There is a downward trend throughout phase B (Figure 10). Overlap is not suggested between Phase A and Phase B (Figure 11); this is supported by significant non-overlap analysis *TAU*= -0.94 (*p* = .009), 90% confidence interval (CI) : -1< > -.35.

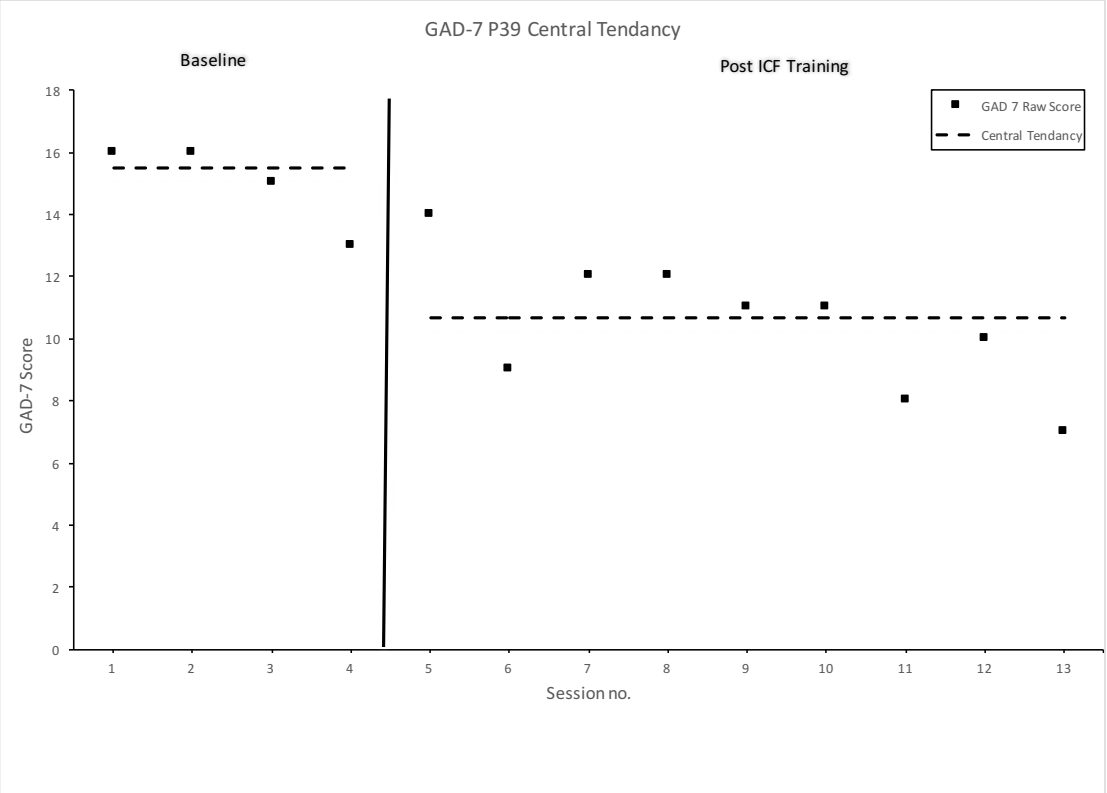

Figure 9. SCED graph showing the central tendency for Participant 39's

GAD-7 score across baseline and post ICF training phases.

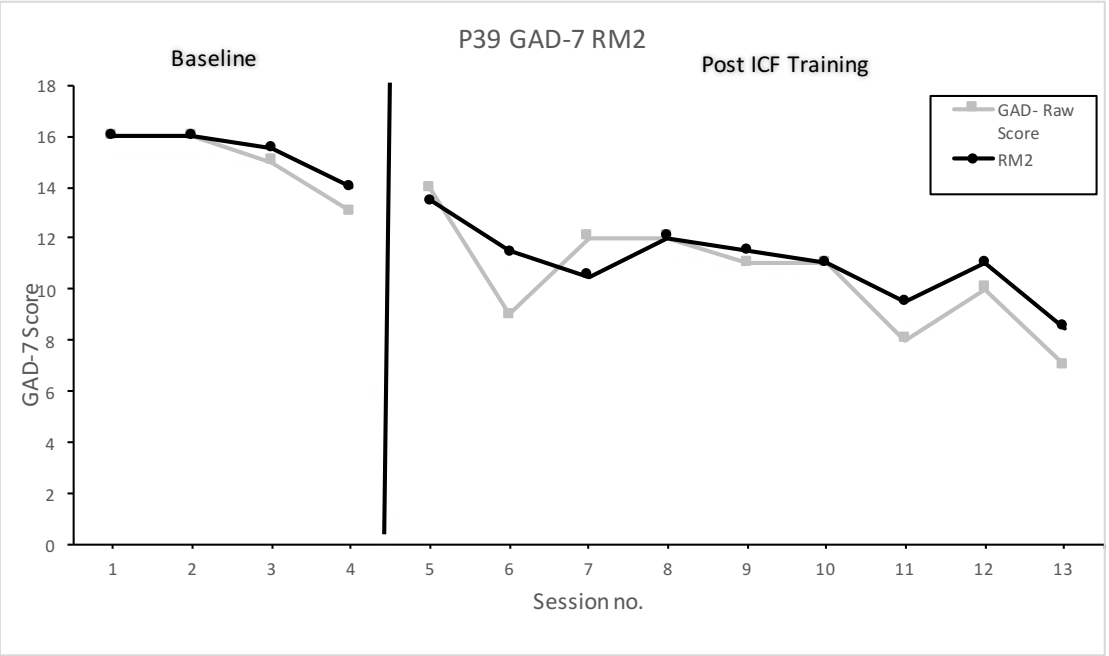

Figure 10. SCED graph showing the trend for Participant 39's GAD-7 score across baseline and post ICF training phases.

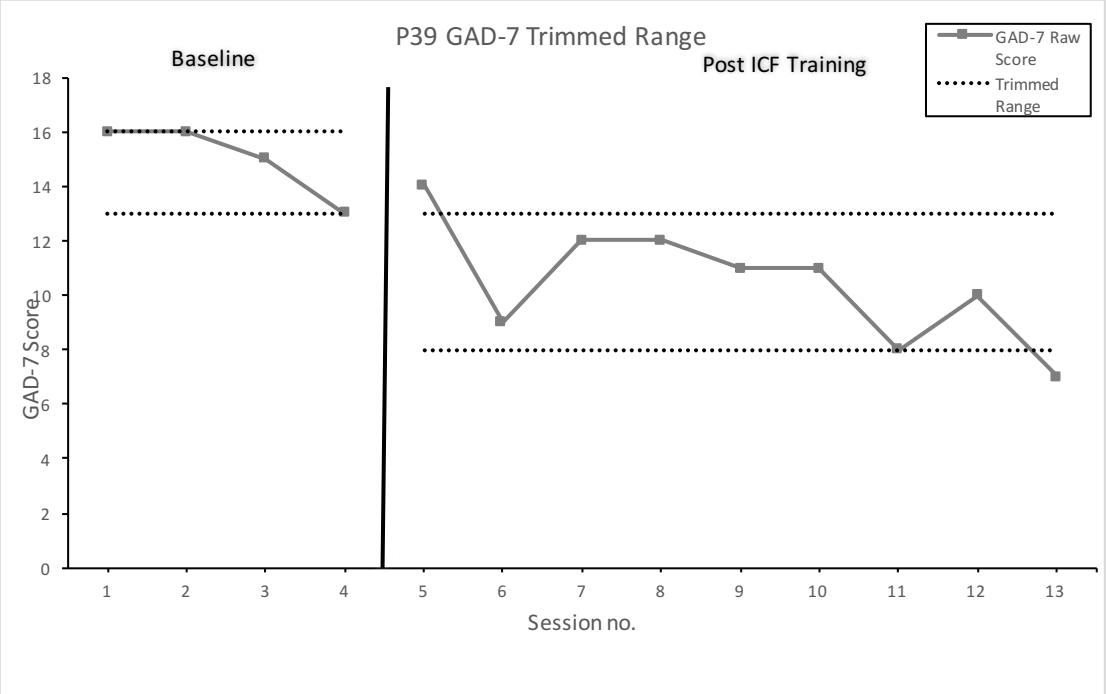

Figure 11. SCED graph showing the overlap for Participant 39's GAD-7 score

across baseline and post ICF training phases.

For the depression score, Participant 39's case remained at the mild depression level from pre- to post treatment and did not meet criteria for reliable change. PHQ-9 for the baseline period was not deemed stable, as it fell outside of the 20% range of the median due to one extreme score. Visual analysis of the central tendency and trend show that there were no visible differences across the phases (Figures 12 and 13). Non-overlap analysis showed that differences between baseline and treatment was not significant, *TAU*= -.55 (p = .16), 90% (CI): -1< >-.09. This is supported by the visual analysis that shows some overlap in the data but all within a similar level of GAD-7 score across the phases (Figure 14).

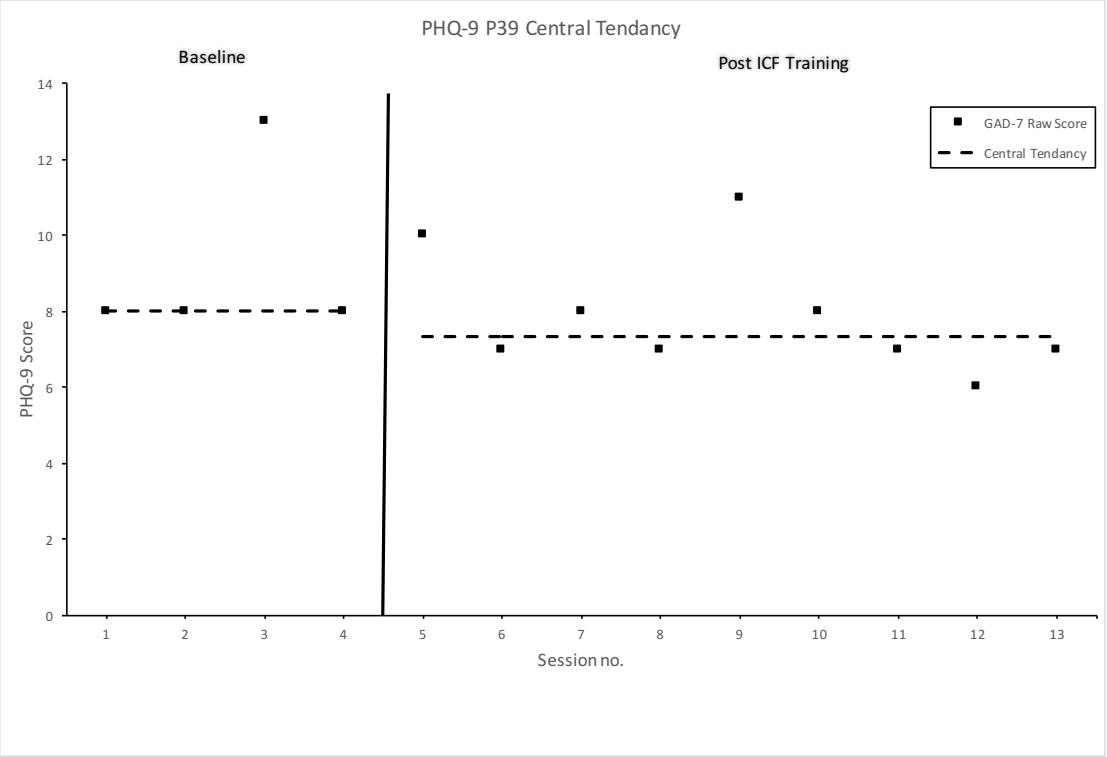

Figure 12. SCED graph showing the central tendency for Participant 39's

PHQ-9 score across baseline and post ICF training phases.

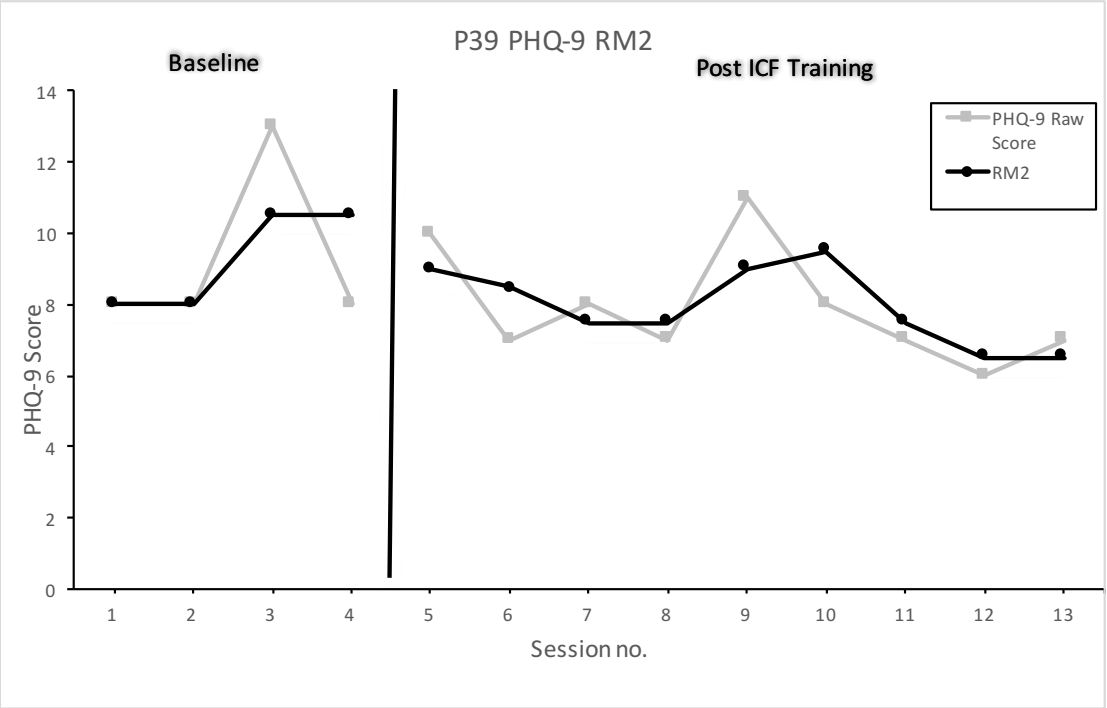

Figure 13. SCED graph showing the trend for Participant 39's PHQ-9 score across baseline and post ICF training phases

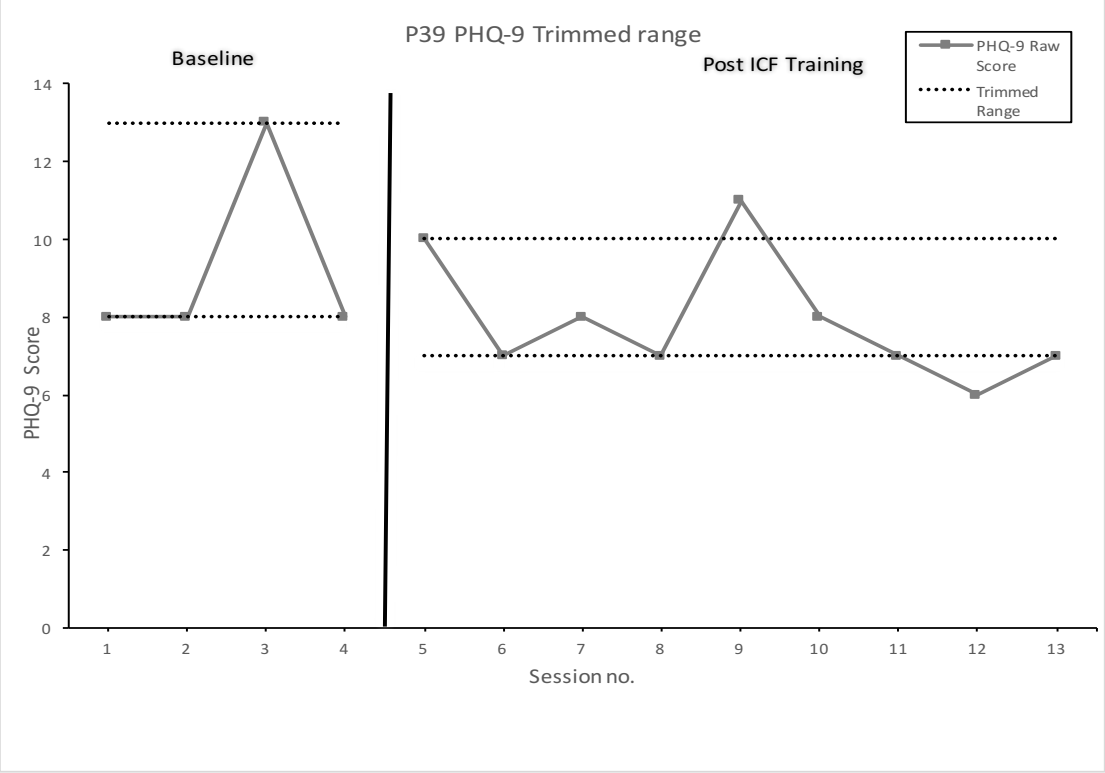

Figure 14. SCED graph showing the overlap for Participant 39's PHQ-9 score across baseline and post ICF training phases.

Participant 41. Participant 41 met for CBT with a male client aged 48 presenting with panic disorder. Three baseline points were collected before Participant 41 attended ICF training. This client made clinically reliable changes in anxiety according to the RCI. Pre-treatment anxiety was severe and reduced to moderate pre-to-post therapy according to clinical cut-offs.

The baseline data for the GAD-7 was stable and was within a 20% range of the median. The baseline shows a slight upwards trend towards the end of the baseline, but this trend was not significant *TAU*= .67 (p = .29), 90% (CI): -.38< >1. The trajectory of the trend changes at the point of the ICF workshop (Figure 16). The central tendency appears to be visibly different across phases (Figure 15) and the variance analysis also clearly shows that there is non-overlap across the phases (Figure 17); this was supported by significant non-overlap analysis *TAU*= -1(p = .01), 90% (CI): -1< >-.34.

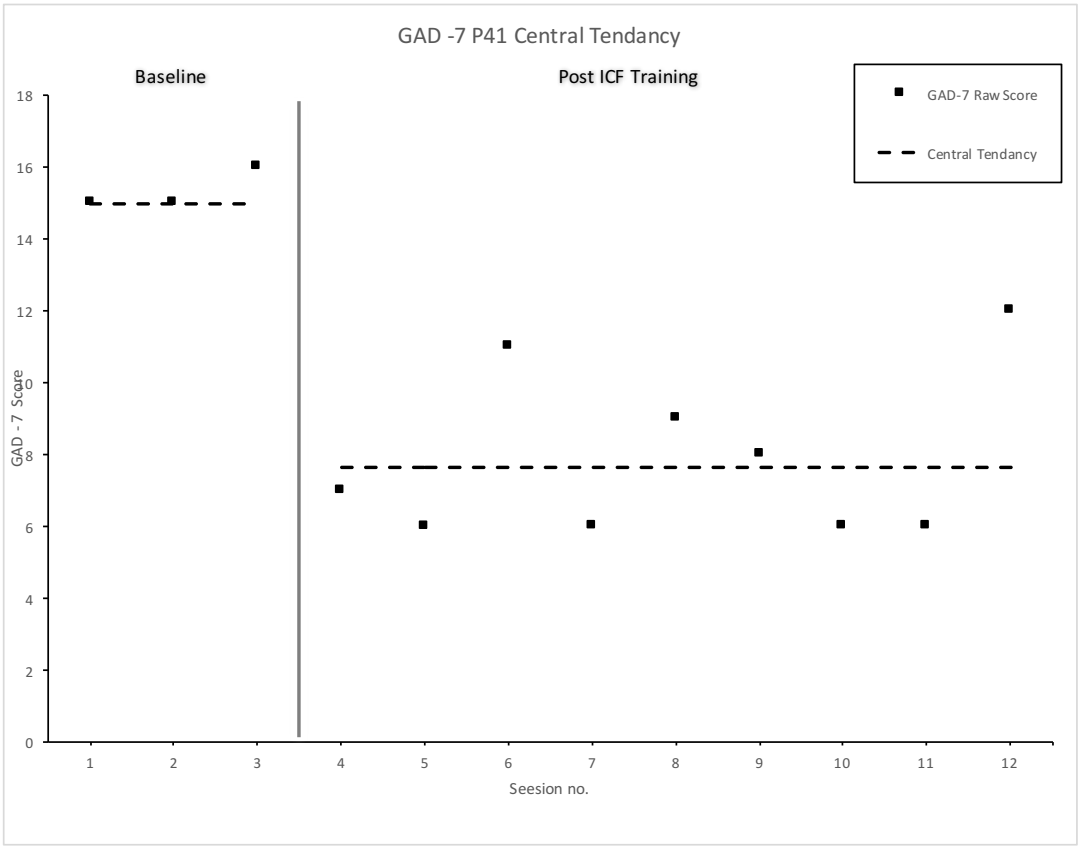

Figure 15. *SCED graph showing the central tendency for Participant 41's GAD-7 score across baseline and post ICF training phases.*

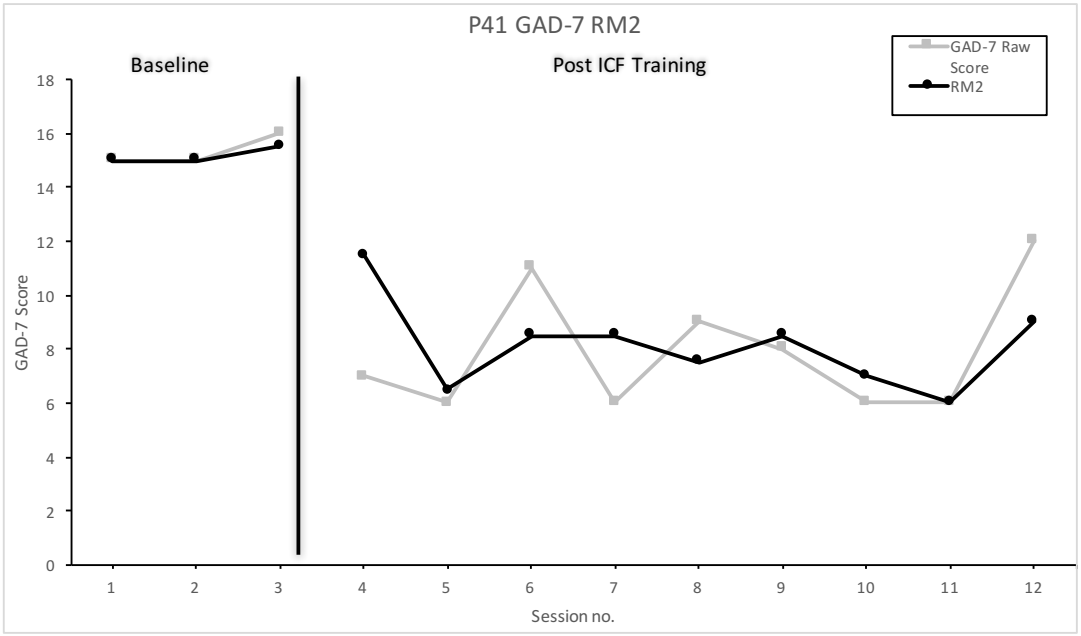

Figure 16. *SCED graph showing the trend for Participant 41's GAD-7 score across baseline and post ICF training phases*

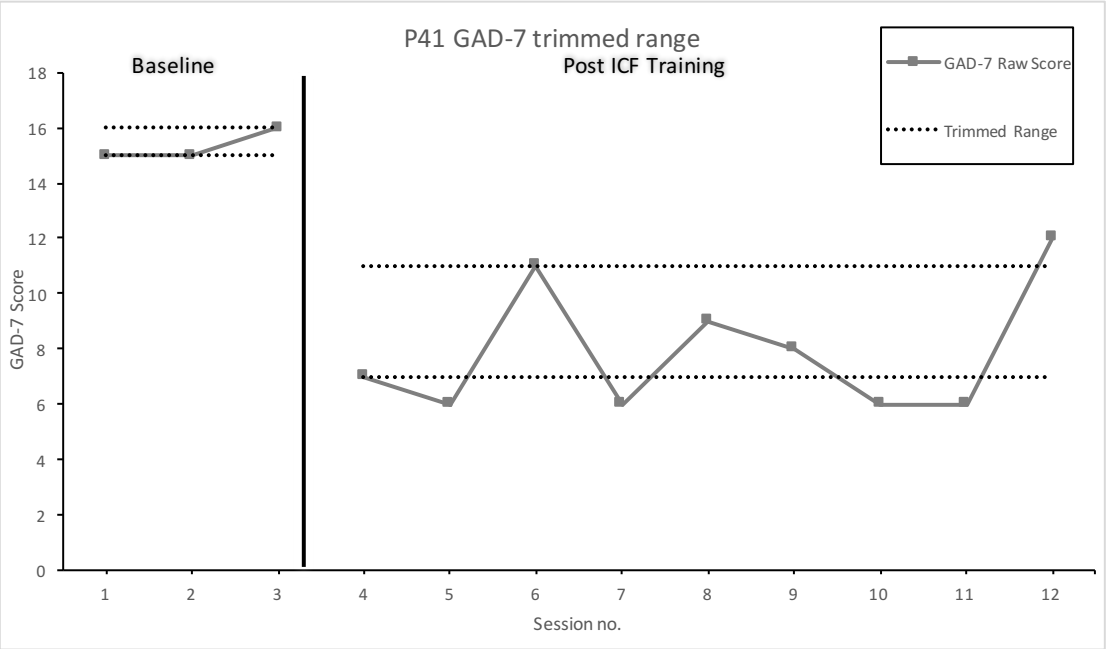

Figure 17. SCED graph showing the overlap of Participant 41's GAD-7 score across baseline and post ICF training phases.

For depression, Participant 41's case made reliable change and moved from moderately severe depression to mild depression according to clinical cut offs. The baseline data was not deemed stable, as it fell outside of the 20% range of the median. There was a visible negative trend in the baseline; however, this was not found to be significant *TAU*= -.67 (p = .30), 90% Confidence Intervals (CI): -1< >-.38.

The visual analysis indicates that the central tendency differed across the baseline and post ICF training phase (Figure 18) and the variance suggests non-overlap (Figure 20), which is supported by the statistical analysis TAU = -.89 (*p* = .03), 90% (CI): -1< >.23. This must be interpreted cautiously due to instability in the baseline phase (Figure 19).

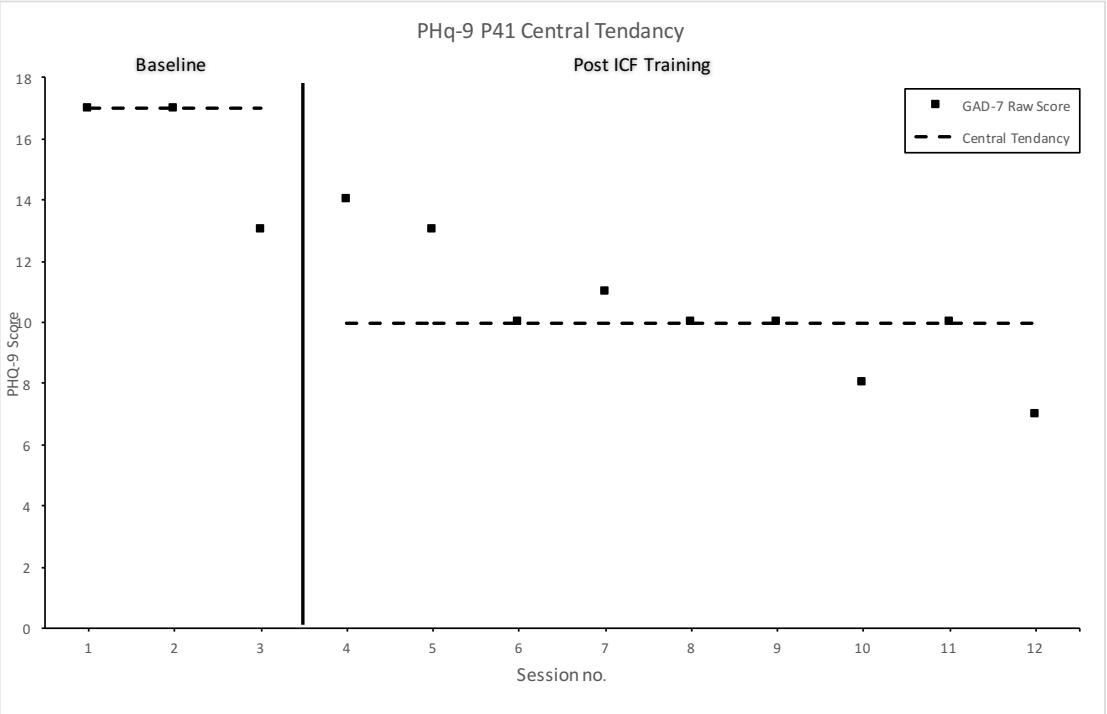

Figure 18. SCED graph showing the central tendency for Participant 41's PHQ-9 score across baseline and post ICF training phases.

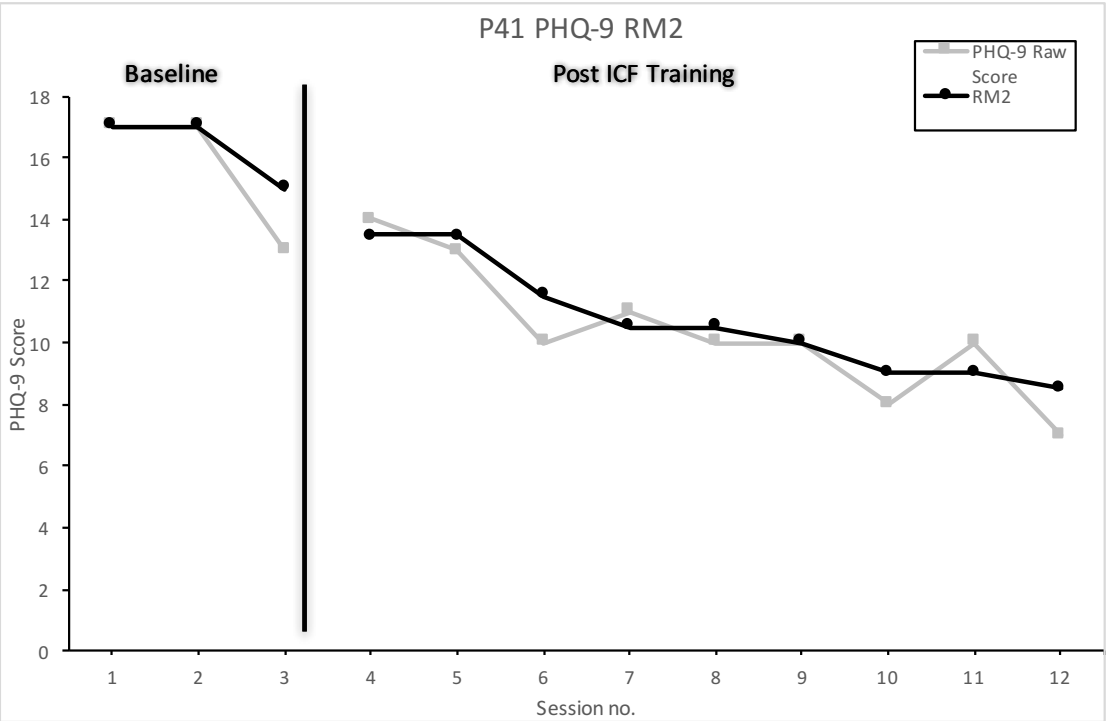

Figure 19. SCED graph showing the trend for Participant 41's PHQ-9 score across baseline and post ICF training phases.

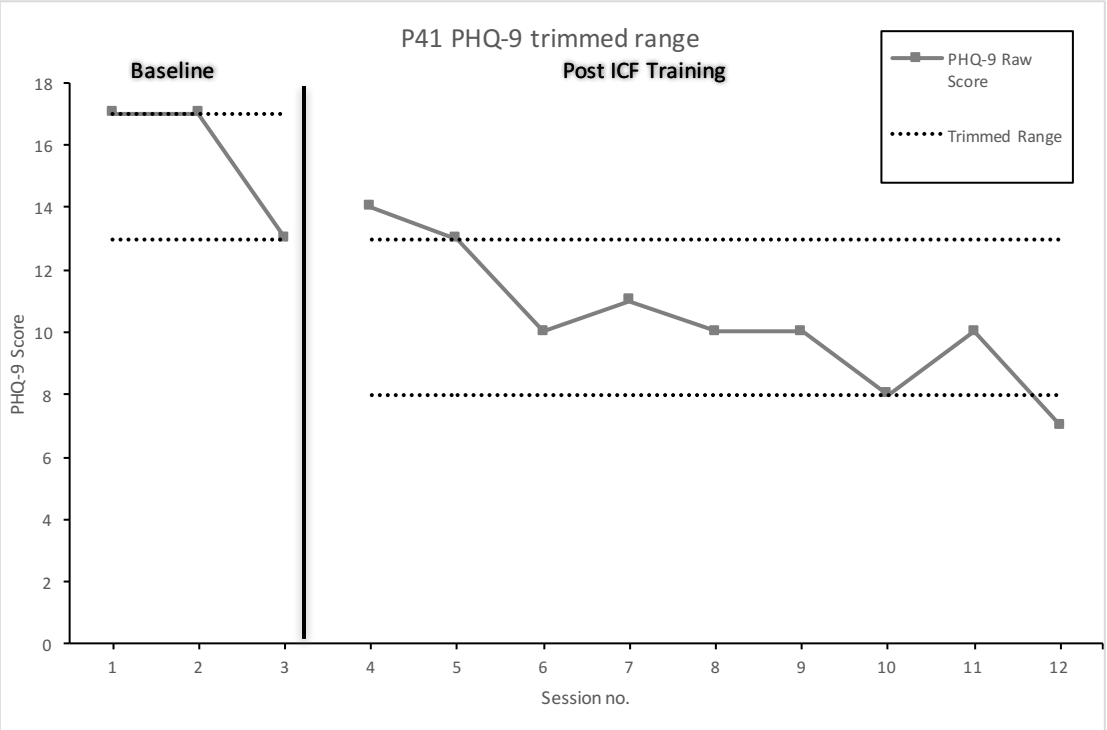

Figure 20. SCED graph showing the overlap for Participant 41's PHQ-9 score across baseline and post ICF training phases.

All SCED analyses apart from Participant 39's PHQ-9 data demonstrate changes significant non-overlap of scores from baseline to post ICF training phase; however, results need to be interpreted cautiously due to the A-B design.

Participant feedback. Overall 35 (83%) of the population of IAPT diploma trainees completed the workshop feedback.

Quantitative data. Trainees were asked to rate how appropriate they found the training. There were a range of ratings, however, most trainees

rated the training as “fair” (43%) or “good” (40%) in terms of appropriateness (Figure 20). There was also a range of ratings of the ICF workshops’ perceived usefulness, however, most trainees rated the ICF workshop as “good” (37%) or excellent (32%) in terms of usefulness (Figure 21).

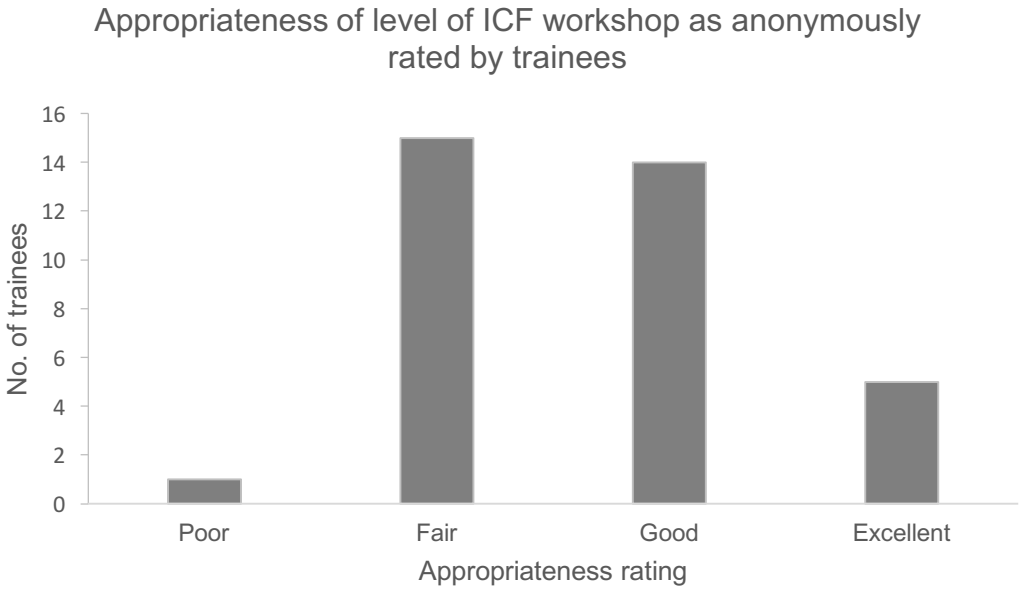

Figure 21. Trainees’ anonymous ratings of appropriateness of the ICF workshop.

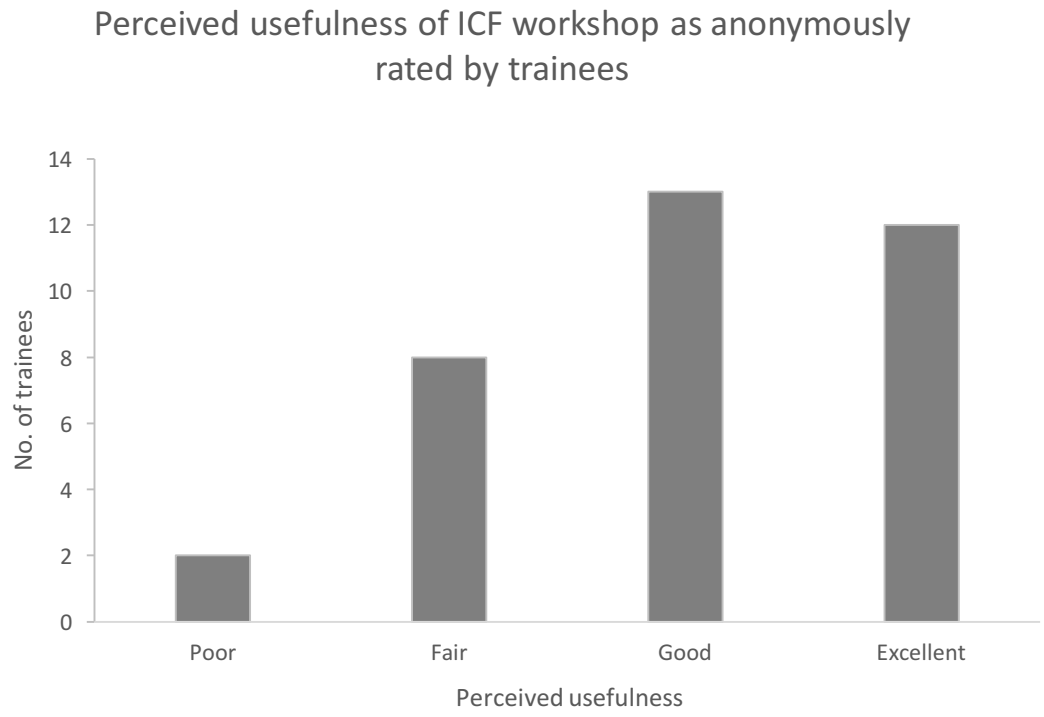

Figure 22. Trainees' anonymous ratings of perceived usefulness of the ICF workshop.

Qualitative data. Trainees were asked to give feedback on what they appreciated about the workshop and what changes or additions could improve the workshop. In terms of the helpful aspects of the ICF training, they mentioned that it had helped them in thinking about their case in more idiographic ways: "Learning [the] difference between idiographic and nomothetic formulations" and had given them permission to think more broadly about their clients "validating that it is OK to think outside the box". They reported the ICF workshops had introduced them to the idea of 'bottom up' rather than 'top down' formulation, for example, "using formulation theory to inform formulation rather than fitting into boxes". Several trainees also mentioned liking the diagramming convention of separating observations from

hypothesis, for example, “I liked looking at the examples and how you can put hypotheses into the formulation” and “ways to represent facts and observations vs. hypotheses were very helpful”.

Several trainees mentioned that formulation was still a difficult concept to understand and requested further training “I still don't understand formulation! Can we please have another session?” and “I am still confused about formulation, I do not feel confident to use this skill in practice”. Others noted that the ICF skills felt different to what they were usually taught and highlighted that supervision could be helpful “This is so different to what I am used to. I think this is something that will become easier with time with more one to one support in supervision”. Suggestions for improving the ICF workshop included formulating a more simplistic case “perhaps formulating some simple presentation. I found the main case study (although realistic) overwhelming” and “some more accessible and less complex practice cases”. Others suggested that more time and follow up teaching would be helpful; “It is a difficult model to understand in one day, useful but a need to follow up in future sessions”.

Discussion

General Conclusions

Phase 1. This study developed and assessed a novel scale for measurement of ICF skills using formulation diagrams. Analysis demonstrated that the ICF-RS's 9-items had good internal consistency. The overall inter-rater reliability of the scale was fair to moderate but further development of certain scale items is required to increase the reliability between raters. The ICF-RS scale was also found to represent one underlying construct through principal components analysis, but a larger sample size is required to verify this with factor analysis. The ICF-RS shows acceptable levels of internal consistency and emerging reliability against accepted criteria, therefore, Aim 1 of the study to report on aspects of reliability of the ICF-RS was accomplished.

The study also assessed which aspects of formulation skills change with training, using a dichotomous checklist of the ICF-RS skills. All skills either significantly improved or where demonstrated in all formulations collected post training, except for the skill of demonstrating hypothesis separate from observations. This shows that the ICF skills checklist had the capacity to detect changes in formulation skill, thus achieving Aim 2 of the study to explore which aspects of ICF skill change because of training.

The study also assessed the associations between ICF skills, CBT

competence and therapists' clinical experience. Hypothesis 1 that increased CBT competence and years of clinical experience would be associated with higher levels of ICF diagramming skill was not supported. There were no significant correlations between ICF skills and CBT competence or years of clinical experience found in this study.

Phase 2. Tentative evidence was found to support Hypothesis 2, that clinical outcome of symptoms of anxiety and depression reduced from pre- to post the workshop phase. This was found in all analysis except for the client's depression score for Participant 39. Reliable clinical change was found in all but one of the training cases' anxiety scores and only one of the training cases' depression scores.

Interpretations and Implications

Phase 1. The ICF-RS is at an early stage of development; therefore, results need to be considered in context of an ongoing process of establishing reliability and validity. The ICF-RS, however, compares to existing measures of formulation quality used in research and clinical settings in that they were found to have elements of reliability and validity but none had established validity in a range of settings (Bucci et al., 2016). Further validation of the scale could be accomplished by comparing it to an existing formulation quality measure such as the CCC-RS (Padesky, Kuyken & Dudley, 2011). Some of the existing measures of formulation skills are criticised as they require extensive training and are time consuming to use. The raters in this study

were study collaborators familiar with the ICF model. An assessment of the training and time commitment required for raters not familiar with the model would be useful to comment on this aspect of the ICF-RS. Further research is also needed to ensure that the ICF-RS scale is sensitive to change across groups with wider ranging formulations skills, by assessing therapists further into their careers such as qualified practitioners and experts. The ICF-RS also requires further development, particularly to the item in which observers rate the demonstration of the mechanisms in formulation diagrams (item 8). With necessary development, the ICF-RS is likely to appeal to those evaluating trainee therapists' formulation skills. The possibility that the scale can be dichotomised using the ICF-DC as a cruder assessment of skill needs to be further developed in terms of reliability and validity. The dichotomization of qualitative variables is often discouraged due to the potential to lose of information about the individual differences of responses (MacCallam et al, 2002). In the meanwhile, the ICF-RS psychometric performance showed that it is suitable for the measurement of formulation skills of novice CBT therapists in an IAPT training setting for both academic vignette and training case formulations.

The finding that ICF skills generally improve with training supports the existing formulation literature as Kendjelic and Eells (2007) found that psychiatric trainees' formulation skills improved with a two-hour formulation workshop. Together, these findings support the idea that formulation skills can be taught declaratively and that formulation skills can improve with discrete and time limited training. This is an important hypothesis as existing research

suggested that formulation quality was higher in those therapists with PhD level training (Persons 1996) and those with qualification with the BABCP (Kuyken et al., 2005). Whilst findings should be considered preliminary, the current study adds weight to the idea that improvements (albeit incremental) can be made with smaller training commitments that require relatively limited resource. This implication should be tempered with the trainee feedback that requested further formulation training. It is however, important to acknowledge the improvements that were made in a one-off session. This is important because a criticism often placed on formulation-driven treatments is that they are costlier and more difficult to disseminate than manualized interventions (Hayes, 1995). The skill of separating out hypotheses from observations in diagrammatic formulations was highlighted by the study as a skill that did not significantly improve with training. Eells, Kendjelic and Lucas (1998) found lower quality case formulations often describe information with no hypothesis or underlying mechanism inferred, therefore it may be that making explicit and distinct hypotheses is a more advanced skill that is likely to develop with experience and supervision. This skill of making explicit and distinct hypotheses was explicitly mentioned in the trainee feedback as a helpful aspect of the ICF training; trainee therapists may therefore acquire this particular skill at different rates. A longitudinal approach monitoring trainee's formulation skills throughout their IAPT diploma training may help to establish if more experiential elements such as supervision improve their capacity to appropriately include hypotheses in diagrammatic formulations.

Study Hypothesis 1 was not supported as no significant correlations between

ICF skills and CBT competence or years of clinical experience were found. Better evidence of validity using the constructs of CBT competence have been found with Gower's (2011) finding that formulation skills as measured using the CCC-RS (Padesky, Kuyken & Dudley, 2011) had a strong positive association with CBT competence. The existing literature comparing clinical experience and formulation skills has mixed results. Dudley et al., (2010) found that overall clinical experience did predict high formulation quality scores whereas, Eells et al., (2005) found that clinical experience did not predict elaborate, complex and systematic formulations. The Eells et al's., (2005) study, however, used therapists with a range of competences including experts, so these findings may not map onto the effect of experience in novice clinicians. In the current study participants had a restricted range of ICF skills and CBT competence due to the relatively novice population, this may have impacted on the ability of the study to demonstrate associations using these variables. In terms of the implications, no conclusions can be drawn about the association of formulation skills and CBT competence or clinical experience as the correlational element of the study was underpowered to detect an effect.

Phase 2. The findings of Phase 2 of the study, that the outcome of symptoms reduced from pre- to post the formulation training needs to be interpreted very tentatively. Firstly, the sample of SCED data was very small with only two participants and therefore did not meet the power requirements of a SCED design to enable an assessment of the effect size (Shadish et al., 2014). Secondly, improvement from the baseline phase to the post workshop

phase was not seen across all items measured. Participant 39's client's depression score did not significantly reduce across phases. This finding is not necessarily a problem for the hypothesis as Participant 39's training case presented with social anxiety and the depression score was in the mild range at both pre- and post the workshops; depression was therefore unlikely to be a treatment target for this client. Going forward it will be important for ICF training to show an impact on outcomes across a range of severity of difficulties, particularly with clients with severe difficulties as this was underrepresented in the current study.

Thirdly, despite the pre- intervention baseline stability observed, the conclusions that can be drawn from an A-B SCED design are limited. It is difficult with this design to distinguish the effects of formulation from other aspects of therapy. This design is not randomised and therefore the potential for the influence of extraneous variables and moderating and mediating factors which limit the causal inferences cannot be controlled. With therapy outcome, there are many potential influences that could threaten the internal validity of the study. It may have been useful to capture some data from the participants and their clients about any other explanations for the effects shown around the time of the ICF workshop. The SCED findings are not definitive but are promising as they suggest that further research into the impact of formulation training on outcome is warranted. SCED designs examine changes within individuals and further analysis is required to establish external validity to allow for the results to be generalised. However, tentatively holding the position that the ICF training improved outcome would

suggest that the skills learnt in the workshop using the vignette do not present "inert knowledge" that is possessed but not applied in practice (Binder, 1993) but that the skills acquired have clinical implications.

Limitations

Phase 1. The current study has inherent associated limitations due to both the design and execution of the research. Both phases of the study were underpowered due to the sample size. It was hoped that more than one training centre would incorporate the ICF workshop to allow for a greater pool of participants, however, due to limitations in the timetable of the courses and time restraints of the project this was not possible. It is hoped that the findings of this study may help to increase the priority of formulation training in IAPT study timetables in future research. The sample size was also impacted by a higher than expected dropout rate among clients being seen, particularly in the training case component of the study. This did not allow for a sufficient sample to compare between the vignette and training case component. The difficulties with recruitment and dropout rate in the training case component may be associated with the inherent difficulties with research in a naturalistic setting, such as trainees not having caseloads up and running as expected and high rates of client dropout in the IAPT setting. However, one IAPT trainee whom refused consent to the study reported that they were anxious about having their formulation diagram assessed. This refusal was despite the participant information explicitly outlining that participation in no way was linked to academic assessment (Appendix C). Previous IAPT trainees also pointed to overwhelming workloads being a potential factor in recruitment and

drop out. The anxiety and workload of participants in formulation studies has important implications for future research as it may serve as a barrier and prevent therapists from accessing important elements of training and supervision.

The correlational element of the design had a limitation in terms of the CBT competence rating. The CBT competence data was a global score on the CTS-R collected from the routine assessments conducted as part of the IAPT diploma training, which presented several issues. Firstly, the cases used in the CTS-R assessment were not matched to the training cases presented in the training case component. Particularly complex or straight forward cases could therefore influence the competency score. Considering the previous IAPT trainee feedback that straight forward cases are often submitted to formal assessment this is likely to be a factor in the representativeness of the CTS-R score. A way forward with this would be to randomise the training case submitted for competency assessment or more realistically in a clinical setting to aggregate CTS-R competency scores from a range of cases. Secondly, the ratings on the CTS-R competency were rated by the IAPT course staff, however, adherence to CTS-R training was not monitored. The inter-rater reliability of the CTS-R ranges from moderate without rater training (r=.44) to good following rater training (r=.67; Reichelt, James & Balckburn, 2003). Therefore, it would have been ideal to monitor the inter-rater reliability of competency in CBT scores to ensure measure was reliable.

Phase 2. An important limitation with Phase 2 of the study was the collection of only the standardised outcome measures (GAD-7 and PHQ-9) as a reflection of therapy outcome. The consulted service user group found this unsatisfactory as some described that measures failed to capture their conceptualisations of constructs of improvement in outcome that result from therapy. Including a measure such as the Manchester Short Assessment of Quality of Life (Pribe et al. 1999) may have provided a way to capture different elements of change. Additionally, the nature of the study involved no direct contact between the researchers and the clients in therapy in the IAPT setting. Although this allows anonymity for clients, it prevented accessing their direct views about their experiences of the formulation diagrams. It is important to hear the client's perceptions of their formulation diagrams and its effect upon them. The clients' viewpoint is important for criterion validity of the formulation as formulation is defined as a way of drawing on psychological theory to describe and explain individual clinical presentations in a way that is coherent and personally meaningful to the client (Dudley, Park, James, & Dodgson, 2010). More crucially, the clients' viewpoint is important because some research has shown that receiving a formulation diagram can be a negative experience for some (Chadwick, Williams and Mackenzie, 2003).

Collecting only standardised measures also a limitation in terms of the ideal SCED design (Morley, 1996). Morley (1996) suggested collecting outcome measures of different levels including standardised measures, individualised target measures for the particular client (e.g., number of panic attacks) and process measures to track changes in a single session (e.g., subjective units

of distress scale). Collecting data at these different levels helps to provide criterion validity for the SCED results, and significant findings across the results can support firmer conclusions than were possible in this study.

Another overall limitation of this study was the SCED design requirement for visual analysis of the data. Research has shown poor inter-rater reliability with interpreting graphical plots (DeProspero & Cohen, 1979). Whilst, supplementary statistical analysis was used where applicable (Morley, 2015). This is an inherent difficulty with SCED analysis, despite attempts by this study to follow Single-case reporting guidelines (Tate et al., 2016). This highlights the importance of the evidence base for formulation skills using multiple research designs of which SCED is one.

A broader limitation of this study was the choice of an IAPT setting, as formulation driven approaches are most indicated in complex and comorbid cases (Key, & Bieling, 2015). The trainees feedback about the workshop explicitly mentions the complexity of the vignette case but also mentions that it felt like a realistic case. This is in line with findings that IAPT cases in clinical practice often must cope with complex presentations (Goddard, Wingrove & Moran, 2015) suggesting that the choice of setting was appropriate.

Another limitation of this study was that formulation skills do not develop in isolation, a design that could have incorporated the supervisory relationship into the formulation diagrams would have had more ecological validity, for example assessing changes to the formulation before and after supervision.

Including the supervisor could have also provided checks on the formulation, for example, checking that the content in terms of observations was accurate. High scores on the ICF-RS might not necessarily indicate an accurate formulation of the client so this tool would need to be used in addition to supervisory relationship to ensure high quality formulations.

Future directions

The ICF-RS requires further analysis to verify and confirm its reliability. As previously mentioned a larger study capable of factor analysis would be important to further explore the components of the scale. The ICF-RS also requires further development of specific items that showed poorer inter-rater reliability and it is not uncommon for scales to be developed in multiple iterations as the psychometric properties are improved, such as was the case with the CTS-R (Blackburn et al. 2001).

As providing the validity of an outcome measure is a cumulative ongoing process (DeVellis, 2012) there are many contexts in which to explore the validity of the ICF-RS further (Holmbeck & Devine, 2009). An important area of validity will be to assess the ICF-RS with therapists with differing levels of experience and expertise. Interestingly, a cross-sectional study is currently underway to compare the development of ICF skills using the ICF-RS across a range of different therapist experience levels (Leung, 2017). This will help to validate the measure across different levels of experience as well as trace the evolution of formulation skills. In terms of the ICF model, further analysis is required about the skill of including and separating hypothesis from

observations. Research exploring this particular component of formulation skill may shed further light on the elements important in developing advanced formulation skills.

Evidence of clinical utility of the ICF model and ICF-RS with clients with more complex and co-morbid presentations will also be essential going forward. A study is currently investigating the ICF model using a case series in the context of PTSD which will provide some further comment on the validity of the scale (Griffith, 2017). In terms of concurrent validity, comparing the ICF-RS scores with other measures of formulation quality would also be an ideal way to further validate its properties.

For ICF-RS to be integrated into the IAPT diploma course assessment schedule, a consultation including a focus group of supervisors and course staff would be required to ensure feasibility. The IAPT diploma courses may request further research to establish cut offs for acceptable levels of ICF formulation using the ICF-RS. Whilst these cut offs are likely to be arbitrary as they are for the CTS-R (Muse & McManus, 2013) they could prove useful in training and in a research context. For example, cut off scores would allow for group level exploration of the characteristics of ‘high scoring’ versus ‘low scoring’ groups.

Studies which seek to further the link between formulation skills and outcome using the SCED methodology could use the multiple baselines approach (Morley, 2015). This approach would randomise the point at which the

baseline phase ends (the point at which trainees receive the ICF training). Although there would need to be a window of time as formulation needs to happen near the start of therapy, the randomisation could give added assurances that the effects observed were due to the ICF workshop as opposed to extraneous factors influencing outcome.

Research into formulation has tended to focus on qualitative methods to find equivalence with the vast body of research in standardised approaches. A creative way to further explore the ICF model in general would be to use a “think aloud” qualitative protocol (Willig & Stainton-Rogers, 2017), in which trainees could describe their thinking processes as they complete a diagrammatic formulation both before and after training. This would provide further evidence of how formulation skills are acquired and evolve.

Summary

This scale development study has provided initial validation of the ICF-RS. The ICF-RS offers a short and relatively psychometrically robust scale for monitoring ICF skills in novice therapists. Whilst the ICF-RS has potential use in training settings, it is important that the scale's sensitivity to different formulation skill levels is established before it is recommended in this context. The study has also provided insight into aspects of formulation skill that are amenable to training and generated a hypothesis about the skills that may be more complex for novice therapists to grasp.

The current study represented a unique quantitative assessment of the ICF model. The current study has contributed to its broad aims of wanting to provide a way of assessing formulation skill to aid the establishment of an evidence base for formulation. Much more research is required to provide a comprehensive understanding of the use of the ICF model. Furthermore, even greater evidence is required for formulation driven interventions to approach parity with the evidence quality for nomothetic approaches. It is clear, however, that formulation and using the ICF approach is a promising and active area of research.

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Appendices

Appendix A. Knowledge Skills and Attitudes Portfolio

The Lead Organisation for CBT in the UK
British Association for Behavioural & Cognitive Psychotherapies

BABCP ACCREDITATION

KSA1 - CRITERION CHECKLIST

Applicant/Candidate Name	

Check the boxes to indicate which evidence is included for each criteria

Criterion Category	Criterion Item	Evidence	Complete & Evidenced
KNOWLEDGE - K	1. Life Stages & Human Development	**A** Training Course/s ***alone*** *or* **B** Reference *plus* **C** Self-directed Study	Self-statement ☐ A ☐ B ☐ C ☐
	2. Health & Social Care Approaches	**A** Training Course/s ***alone*** *or* **B** Reference *plus* **C** Self-directed Study	Self-statement ☐ A ☐ B ☐ C ☐
	3. Psychopathology / Diagnostic Skills	**A** Training Course/s ***alone*** *or* **B** Reference *plus* **C** Self-directed Study	Self-statement ☐ A ☐ B ☐ C ☐
	4. Models of Therapy	**A** Training Course/s ***alone*** *or* **B** Reference *plus* **C** Self-directed Study	Self-statement ☐ A ☐ B ☐ C ☐
SKILLS - S	5. Competency in Key Relationship Skills	**B** Reference *plus* Minimum **x1 other** item of evidence from **A** Training Course/s **C** Self-directed Study **D** Course or Job Admission Criteria	Self-statement ☐ A ☐ B ☐ C ☐ D ☐

SKILLS - S	6. Maintain & Manage Records and Reports	**B** Reference *plus* Minimum **x1 other** item of evidence from **A** Training Course/s **C** Self-directed Study **D** Course or Job Admission Criteria	Self-statement ☐ A ☐ B ☐ C ☐ D ☐
	7. Communication with Services & Colleagues	**B** Reference *plus* Minimum **x1 other** item of evidence from **A** Training Course/s **C** Self-directed Study **D** Course or Job Admission Criteria	Self-statement ☐ A ☐ B ☐ C ☐ D ☐
	8. Awareness of Risk	**A** Training Course/s *plus* **B** Reference	Self-statement ☐ A ☐ B ☐
	9. Comprehension of Research	**A** Training Course/s *plus* **B** Reference	Self-statement ☐ A ☐ B ☐
	10. Commitment to Ethical Principles	**A** Training Course/s *plus* **B** Reference	Self-statement ☐ A ☐ B ☐
ATTITUDES - A	11. Fitness to Practice and Suitable at a Personal Level	**B** Reference *(provided by a Referee, not a countersigned self-statement)*	Self-statement ☐ B ☐
	12. Self Evaluation and Reflection	**B** Reference *(provided by a Referee, not a countersigned self-statement)*	Self-statement ☐ B ☐
	13. Has Enquiring Mind and is Receptive to Scientist Practitioner Approach	**B** Reference *(provided by a Referee, not a countersigned self-statement)*	Self-statement ☐ B ☐

14. Biography or Clinical Experience Record	Biography	Bio ☐

Applicant/Candidate Signature	

Appendix B. Initial Participant Contact

Research project on case formulation

Overview

Email 11 October	• Present study to IAPT trainees • Distribute information sheets and consent forms • Distribute forms for recording scale scores • Distribute Formulation diagram form
25 October	• Collect remaining consent forms for those participating in the research • Collect formulation diagram form(s) for trainee cases
After 25 October	• Trainees complete repeat diagram of their own case. • Feedback provided by research team to trainees through supervisor on formulations. • Data is collected on pre- and post-workshop symptom measures

What is the purpose of the study?

The development of formulation skills is considered to be an essential part of training to deliver therapeutic interventions. This project aims to establish if formulation skills can be improved with training, in particular if formulation diagramming can be improved by attending a workshop. As part of high intensity training, you are invited to attend a one-day workshop on formulation. We hope to use the formulation diagrams created by you in the workshop to assess the development of formulation skills. Further assessments of formulation skills will be sought from your clinical supervisors and routinely collected clinical outcome data will help to assess the impact of the formulation workshop upon formulation skills and clinical outcome.

The study is being conducted by Danelle Pettman as a part of a DClinPsy project at the Department of Psychology, Royal Holloway University of London. If you agree to participate in this project, the research will be written up as a thesis. On successful submission of the thesis, it will deposited both in print and online in the University archives, to facilitate its use in future research. The thesis will be published with open access, meaning available to every Internet user.

What does participation involve?

The study involves two parts. The first part of the study is based around the formulation workshop. The second part of the study involves collecting data over the course of your training. If you decide that you would like to take part, we will ask you to;

- Complete a consent form stating that you agree to take part in the study
- Complete a short demographics questionnaire
- Engage in the formulation exercises as part of the formulation workshop. This includes the requirement to bring an anonymised formulation to the workshop and to reformulate this case at the end of the workshop. As part of the workshop you will also be asked to complete a formulation based on a vignette at the beginning and end of the workshop. If you agree to take part in the study we will use the formulation diagrams you complete in the analysis of the study.
- Complete a feedback form about your experiences of the formulation workshop.

The workshop will take the course of one whole training day; the additional paperwork that will form the participation in the research will take approximately 30 minutes.

In addition to the data collected on the day of the formulation workshop, the clinical outcome measures of your training cases will be analysed and your clinical supervisor will provide the research team with assessments of your formulation skills as part of your regular supervision.

IMPORTANT: One aim of the study will be to determine whether training in ICF has an impact on client outcome. To be able to demonstrate this, we need to collect baseline data on AT LEAST ONE CASE you are seeing BEFORE the workshop on 25 October. Specifically, we need to have scores on the PHQ-9 and GAD-7 for AT LEAST THREE measurement points PRIOR to October 25. These can be any combination of three successive measurements, for example, one data point at triage, one at assessment, and one at the start of therapy. You should then continue to collect data for that client for six more rating occasions or until you finish therapy, whichever comes first.

Relationship to other course requirements

Tape ratings: the ideal situation would be for the case you select to be the one that you submit for the first rated tape due 8 November, particularly given that a requirement for the tape rating is that you submit a formulation diagram. The main difficulty is that you will not start supervision until November 8 and choice of appropriate training cases to submit typically benefits from supervisor input. To maximise the likelihood that you will be able to use the case you track for the tape rating

1. Choose a case/cases that have fairly non-complex presentation and low comorbidity
2. Choose several (3-4) cases that you will track in order to make it more likely that one of these will be suitable for submitting for the tape rating. *You will receive feedback through your supervisor on all cases for which you track and submit a formulation diagram*.

Formulation training diagram form

1. Please provide a concise summary of your client's presenting problem based on the information you have collected in your assessment.

2. Please explain the symbols you will be using in your diagram

   Example: Boxes = behaviours; Single headed arrows = shows one thing causing another

3. On the following page, please provide a diagram of the client's problem that conveys how you have formulated their problem in order to guide your intervention.

Your formulation diagram:

C26

	A	B	C	D
1				
2	Outcome Data Record	*Example*		
3				
4	Trainee's name	*Adam Smith*		
5				
6	Client no.	*1*		
7	Age	*35*		
8	Gender	*F*		
9	Presenting Problem	*Social Anxiety*		
10				
11	GAD-7 Score Triage	*7*		
12	GAD-7 Scrore Ax 1	*7*		
13	GAD-7 Score Ax 2	*6*		
14	GAD-7 Score Session 1	*6*		
15	GAD-7 Score Session 2	*5*		
16	GAD-7 Score Session 3	*6*		
17	GAD-7 Score Session 4	*6*		
18	GAD-7 Score Session 5	*6*		
19	GAD Score Session 6...	*6*		
20				
21	PHQ-9 Score Triage	*3*		
22	PHQ-9 Scrore Ax 1	*3*		
23	PHQ-9 Score Ax 2	*4*		
24	PHQ-9 Score Session 1	*5*		
25	PHQ-9 Score Session 2	*6*		
26	PHQ-9 Score Session 3	*6*		
27	PHQ-9 Score Session 4	*6*		
28	PHQ-9 Score Session 5	*6*		
29	PHQ-9 Score Session 6...	*6*		
30				
31	Other routinely collected outcome measures			
32				
33				

Summary

1. Please identify at least one case for which you will have at least three sets of data before 25 October.

2. Please complete a formulation diagram for this case as best as you can before 25 October and bring the formulation to the workshop (form will be emailed to you).

3. You can either turn in the consent form today or at the workshop.

Appendix C. Participant Information Sheet

Doctorate
in Clinical
Psychology

Department of Psychology
Egham Hill
Egham
TW20 0EX

TEL: 01784 414012
EMAIL: Danelle.Pettman.2014@live.rhul.ac.uk

PARTICIPANT INFORMATION SHEET

The Impact of Formualtion Training Study
IRAS reference: 208947

Principal Researcher: Danelle Pettman, Supervisor: Dr Gary Brown

You are being invited to take part in a study assessing the impact of formulation training on clinical skills and clinical outcomes. In order to decide whether you would like to take part, please read through the following information explaining why the study is being conducted and what your involvement would be. We are more than happy to answer any questions you may have before agreeing to participate.

Why have I been contacted?

You have been invited to take part in the study because you are currently studying for a High-Intensity IAPT CBT trainee qualification on a BABCP accreditation courses. As part of your training you receive a workshop on formulation and have a caseload of training cases, we would therefore like to assess the impact that this formulation training has upon your clinical skills and the outcomes of your training cases.

What is the purpose of the study?

The development of formulation skills is considered to be an essential part of training to deliver therapeutic interventions. This project aims to establish if formulation skills can be improved with training, in particular if formulation diagramming can be improved by attending a workshop. As part of high intensity training, you are invited to attend a one-day workshop on formulation. We hope to use the formulation diagrams created by you in the workshop to assess the development of formulation skills. Further assessments of formulation skills will be sought from your clinical supervisors and routinely collected clinical outcome data will help to assess the impact of the formulation workshop upon formulation skills and clinical outcome.

The study is being conducted by Danelle Pettman as a part of a DClinPsy project at the Department of Psychology, Royal Holloway University of London. If you agree to participate in this project, the research will be written up as a thesis. On successful submission of the thesis, it will deposited both in print and online in the University archives, to facilitate its use in future research. The thesis will be published with open access, meaning available to every Internet user.

What does participation involve?

The study involves two parts. The first part of the study is based around the formulation workshop. The second part of the study involves collecting data over the course of your training. If you decide that you would like to take part, we will ask you to;

- Complete a consent form stating that you agree to take part in the study

- Complete a short demographics questionnaire
- Engage in the formulation exercises as part of the formulation workshop. This includes the requirement to bring an anonymised formulation to the workshop and to reformulate this case at the end of the workshop. As part of the workshop you will also be asked to complete a formulation based on a vignette at the beginning and end of the workshop. If you agree to take part in the study we will use the formulation diagrams you complete in the analysis of the study.
- Complete a feedback form about your experiences of the formulation workshop.

The workshop will take the course of one whole training day; the additional paperwork that will form the participation in the research will take approximately 30 minutes.

In addition to the data collected on the day of the formulation workshop, the clinical outcome measures of your training cases will be analysed and your clinical supervisor will provide the research team with assessments of your formulation skills as part of your regular supervision.

Please note that all questionnaires and formulation diagrams will be identified by a unique ID number, rather that your name, and that your completed questionnaire will be separated from your demographic form upon receipt to ensure anonymity.

Am I required to take part?

You are free to attend the formulation workshop and take part in the exercises without taking part in the study. Please also note that your involvement in the study will not in any way affect your academic assessment during your training.

It is entirely up to you if you wish to take part. If you do decide to take part, you are free to change your mind at any time. You can withdraw during any phase of the study, without giving a reason and without any penalty, by letting the researcher know. If this is the case, any data collected from you will no longer be included in subsequent analyses and will be destroyed.

Will my taking part in the study be kept confidential?

All information collected from you during the course of the research would be kept strictly confidential within the limits of the law. You will be allocated a unique number, ensuring that all materials related to your participation (e.g. completed questionnaires and formulation diagrams) will contain a unique number rather than your actual name.

In accordance with British Psychological Society research guidelines, all data for the study will be securely stored for 5 years and will be destroyed after this time. The research data you provide will only be accessed by members of the research team, however, individuals from Royal Holloway University of London and other regulatory authorities may require access to relevant data for the purpose of audit and monitoring.

What are the possible advantages of taking part?

Taking part in this study will allow you to find out more about the impact of taking part in formulation training if you would like to be provided with a summary of the results.

It is important to have a valid and reliable ways of measuring quality in individual case formulation and the information you provide will be beneficial in helping to develop initial quality measures and thus will help to improve current methods of assessing formulation quality.

What are the possible disadvantages of taking part?

Given the nature of this study, it is highly unlikely that you will suffer harm by taking part. However, if the formulation exercises or the questionnaires happen to include any questions which, for whatever reason, you do not wish to answer then the question can be omitted.

What if there is a problem?

If you have a concern about any aspect of this project, please speak to the researcher concerned (contact details below) who will do her best to answer your query. If you remain unhappy and wish to make a formal complaint, please contact the Research Ethics Committee at Royal Holloway University of London (ethics@rhul.ac.uk or call 01784276226).

Who has reviewed this study?

The study was reviewed by the Health Research Authority and received approval on 31st August 2016.

Contact Details:

If you require further information or would like to ask any questions, please do not hesitate to contact either the Principal Researcher or Supervisor using the details below.

Principal Researcher:

Danelle Pettman
Trainee Clinical Psychologist
Department of Psychology
Egham Hill
Egham
TW20 0EX
Tel: 01784 414012
Email: Danelle.Pettman.2014@live.rhul.ac.uk

Supervisor:

Dr. Gary Brown
Senior Lecturer in Clinical Psychology
Department of Psychology
Egham Hill
Egham
TW20 0EX
Tel: 01784 414330
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Appendix D. Consent Form

Doctorate
in Clinical
Psychology

Department of Psychology
Egham Hill
Egham
TW20 0EX

TEL: 01784 414012
EMAIL: Danelle.Pettman.2014@live.rhul.ac.uk

CONSENT FORM
The Impact of Formualtion Training Study
IRAS Reference: 208947

Principal Researcher: Danelle Pettman, Supervisor: Dr Gary Brown

Study Purpose: The study aims to assess the impact of a formulation workshop on High Intensity CBT trainee's clinical skills and clinical outcomes.

	Please initial box
I confirm that I have read and understand the information sheet dated 03/09/2016 for the above study. I have had the opportunity to consider the information, ask questions and have had any questions I asked answered satisfactorily.	☐
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without any penalty for doing so.	☐
I understand that personal data will be stored and identified using only a number code, will be accessed only by members of the research team and will be destroyed after a period of 5 years.	☐
I understand that the data collected during the study may be looked at by Royal Holloway University of London staff and other regulatory authorities, for the purpose of audit and monitoring, and where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	☐
I understand that the research will be written up as a thesis which will be deposited both in print and online in the University archives. The thesis will be published with open access, meaning available to every internet user.	☐
I understand how to raise a concern or make a complaint.	☐
I agree to take part in the above study.	☐
I would like to be contacted after the study with a summary of the findings and therefore provide the research team with the following email address to forward this to:	☐

……

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Appendix E. Royal Holloway Ethical Review Self-Certificate

Ethics Review Details

You have chosen to self certify your project.	
Name:	Pettman, Danelle (2014)
Email:	PBVA082@live.rhul.ac.uk
Title of research project or grant:	The Impact of Formulation Training on Trainee CBT Therapists
Project type:	Royal Holloway postgraduate research project/grant
Department:	Psychology
Academic supervisor:	Dr Gary Brown
Email address of Academic Supervisor:	Gary.brown@rhul.ac.uk
Funding Body Category:	No external funder
Funding Body:	
Start date:	30/09/2016
End date:	30/09/2017

Research question summary:

Individual case formulation (ICF) also referred to as 'formulation' is the method a therapist uses to synthesise research evidence with the needs of the individual client to create a focus in therapeutic work. The development of ICF skills is considered to be an essential part of training. There is however little research around how therapists acquire ICF skills. As ICF skills are considered a vital part of therapy it is important to understand how to develop these skills. This project aims to establish in what way ICF skills improve with training as reflected in changes in the diagrams used to represent formulations. The sample will be High Intensity (HI) trainees on the Cognitive Behavioural Therapy (CBT) course accredited by the British Association for Behavioural and Cognitive Psychotherapies (BABCP). As part of the training course, the trainees attend a one-day workshop on formulation. The formulation diagrams created by the trainee therapist' pre and post the workshop will be scored on criteria considered important in developing the skills of formulation. Clinical supervisors will also independently judge the participant's ICF skills both before and after the workshop. It is expected that the formulation diagrams will exhibit more items deemed important in developing a formulation after the training session. It is also expected that the independent ratings of ICF skills will increase after the training session. The formulation exercises that the trainees complete in the workshop will be used in the analysis and the trainees will be asked to fill out feedback forms. Following this a single case experimental design will be used to assess anonymised routinely collected outcome data to judge if attending the workshops had an impact on the clinical outcome for the training cases covering a period of both before and after the workshop.

Research method summary:

This project will be separated into two parts. Study 1 will be concerned with the impact of training on formulation and study 2 will investigate the impact of training on treatment outcomes.

Study 1

Participants will submit the formulation of one of their training cases that they had been asked to bring along to the workshop. The participants will then be asked to re-formulate the same case at the end of the workshop. Participants will also be asked to complete a formulation based on an example case vignette both pre and post the workshop as part of the training. The study will use a pre-post design to assess participant's formulation skills before and after the formulation workshop. The rating team will assess the trainee's formulations both pre and post the training on the collaborative case conceptualisation rating scale (Padesky, Kuyken & Dudley, 2011). Clinical supervisors will also be asked to score the trainees formulations on the collaborative case conceptualisation rating scale (Padesky, Kuyken & Dudley, 2011) during weekly supervision.

Study 2

A single case design methodology will be used to examine the effect of the formulation workshops presented in study one on the clinical outcomes for the participants trainee cases. An A-B Single case experimental design (SCED) using multiple baselines will be applied to the routinely collected clinical outcomes for the HI- trainees. The 'A' phase refers to the period prior to the formulation workshop and 'B' phase referring to the period after. The outcome measures used will be the Patient Health Questionnaire - 9 (PHQ-9) and the Generalised Anxiety Disorder -7 (GAD-7).

Risks to participants

Does your research involve any of the below?
Children (under the age of 16),
No

Participants with cognitive or physical impairment that may render them unable to give informed consent,
No

Participants who may be vulnerable for personal, emotional, psychological or other reasons,
No

Participants who may become vulnerable as a result of the conduct of the study (e.g. because it raises sensitive issues) or as a result of what is revealed in the study (e.g. criminal behaviour, or behaviour which is culturally or socially questionable),
No

Participants in unequal power relations (e.g. groups that you teach or work with, in which participants may feel coerced or unable to withdraw),
Yes

Participants who are likely to suffer negative consequences if identified (e.g. professional censure, exposure to stigma or abuse, damage to professional or social standing),
No

Details,
The study will be conducted in the context of a formulation workshop in which my academic supervisor will be teaching. The participants are however adults working within the NHS and will be required to give informed consent and reminded that they are free to withdraw from the study at any point.

Design and Data

Does your study include any of the following?

Will it be necessary for participants to take part in the study without their knowledge and/or informed consent at the time?,
No

Is there a risk that participants may be or become identifiable?,
No

Is pain or discomfort likely to result from the study?,
No

Could the study induce psychological stress or anxiety, or cause harm or negative consequences beyond the risks encountered in normal life?,
No

Does this research require approval from the NHS?,
Yes

If so what is the NHS Approval number,

208947

Are drugs, placebos or other substances to be administered to the study participants, or will the study involve invasive, intrusive or potentially harmful procedures of any kind?,
No

Will human tissue including blood, saliva, urine, faeces, sperm or eggs be collected or used in the project?,
No

Will the research involve the use of administrative or secure data that requires permission from the appropriate authorities before use?,
Yes

Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?,
No

Is there a risk that any of the material, data, or outcomes to be used in this study has been derived from ethically-unsound procedures?,
No

Details,
Anonymized routinely collected clinical outcome data will be used in the analysis.

Risks to the Environment / Society

Will the conduct of the research pose risks to the environment, site, society, or artifacts?,
No

Will the research be undertaken on private or government property without permission?,
No

Will geological or sedimentological samples be removed without permission?,
No

Will cultural or archaeological artifacts be removed without permission?,
No

Details,

Risks to Researchers/Institution

Does your research present any of the following risks to researchers or to the institution?

Is there a possibility that the researcher could be placed in a vulnerable situation either emotionally or physically (e.g. by being alone with vulnerable, or potentially aggressive participants, by entering an unsafe environment, or by working in countries in which there is unrest)?,
No

Is the topic of the research sensitive or controversial such that the researcher could be ethically or legally compromised (e.g. as a result of disclosures made during the research)?,
No

Will the research involve the investigation or observation of illegal practices, or the participation in illegal practices?,

No

Could any aspects of the research mean that the University has failed in its duty to care for researchers, participants, or the environment / society?,

No

Is there any reputational risk concerning the source of your funding?,

No

Is there any other ethical issue that may arise during the conduct of this study that could bring the institution into disrepute?,

No

Details,

Declaration

By submitting this form, I declare that the questions above have been answered truthfully and to the best of my knowledge and belief, and that I take full responsibility for these responses. I undertake to observe ethical principles throughout the research project and to report any changes that affect the ethics of the project to the University Research Ethics Committee for review.

Certificate produced for user ID, PBVA082

Date:	21/07/2016 15:07
Signed by:	Pettman, Danelle (2014)
Digital Signature:	Danelle Pettman
Certificate dated:	7/21/2016 4:16:30 PM
Files uploaded:	IRASForm_submitted_3_6_16.pdf

Appendix F. Health Research Authority Letter of Approval

NHS
Health Research Authority

Ms Danelle Pettman
Researcher/Postgraduate Student
Camden & Islington NHS Foundation Trust
Clinical Psychology Department
Royal Holloway, University of London
Egham Hill, Egham
TW20 0EX

Email: hra.approval@nhs.net

31 August 2016

Dear Danelle Pettman

Letter of HRA Approval

Study title:	**The Impact of Formulation Training on Cognitive Behavioural Therapist's Formulation skills and Clinical Outcomes**
IRAS project ID:	**208947**
Protocol number:	**N/A**
Sponsor	**Royal Holloway**

I am pleased to confirm that **HRA Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications noted in this letter.

Participation of NHS Organisations in England

The sponsor should now provide a copy of this letter to all participating NHS organisations in England.

Appendix B provides important information for sponsors and participating NHS organisations in England for arranging and confirming capacity and capability. **Please read *Appendix B* carefully**, in particular the following sections:

- *Participating NHS organisations in England* – this clarifies the types of participating organisations in the study and whether or not all organisations will be undertaking the same activities
- *Confirmation of capacity and capability* - this confirms whether or not each type of participating NHS organisation in England is expected to give formal confirmation of capacity and capability. Where formal confirmation is not expected, the section also provides details on the time limit given to participating organisations to opt out of the study, or request additional time, before their participation is assumed.
- *Allocation of responsibilities and rights are agreed and documented (4.1 of HRA assessment criteria)* - this provides detail on the form of agreement to be used in the study to confirm capacity and capability, where applicable.

Further information on funding, HR processes, and compliance with HRA criteria and standards is also provided.

It is critical that you involve both the research management function (e.g. R&D office) supporting each organisation and the local research team (where there is one) in setting up your study. Contact details and further information about working with the research management function for each organisation can be accessed from www.hra.nhs.uk/hra-approval.

Appendices

The HRA Approval letter contains the following appendices:

- A – List of documents reviewed during HRA assessment
- B – Summary of HRA assessment

After HRA Approval

The attached document *"After HRA Approval – guidance for sponsors and investigators"* gives detailed guidance on reporting expectations for studies with HRA Approval, including:

- Working with organisations hosting the research
- Registration of Research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics and is updated in the light of changes in reporting expectations or procedures.

Scope

HRA Approval provides an approval for research involving patients or staff in NHS organisations in England.

If your study involves NHS organisations in other countries in the UK, please contact the relevant national coordinating functions for support and advice. Further information can be found at http://www.hra.nhs.uk/resources/applying-for-reviews/nhs-hsc-rd-review/.

If there are participating non-NHS organisations, local agreement should be obtained in accordance with the procedures of the local participating non-NHS organisation.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please email the HRA at hra.approval@nhs.net. Additionally, one of our staff would be happy to call and discuss your experience of HRA Approval.

HRA Training

We are pleased to welcome researchers and research management staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

IRAS project ID	208947

Your IRAS project ID is **208947**. Please quote this on all correspondence.

Yours sincerely

Nicola Gilzeane
Assessor

Email: hra.approval@nhs.net

Copy to: *Ms Lucy Caton, Royal Holloway University of London, Sponsor Contact*

Noclor, Lead NHS R&D Contact

Appendix A - List of Documents

The final document set assessed and approved by HRA Approval is listed below.

Document	*Version*	*Date*
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Indemnity insurance]	v1.0	18 May 2016
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Insurance certificate]		19 May 2016
IRAS Application Form [IRAS_Form_03062016]		03 June 2016
Letters of invitation to participant [Initial Contact]	v1.1	18 May 2016
Other [Statement of Intent submitted to RH Research Sub committee 25.08.2015]	v1.0	28 August 2015
Other [Statement of Intent approval recieved from RH Research Sub committee]	v1.0	18 September 2015
Other [Research Proposal Submitted to RH Research Sub Committee]	v1.0	02 December 2015
Other [Provisional Approval from RH Research Sub Committee]	v1.0	15 January 2016
Other [Reply to RH Research Sub Committee]	v1.0	11 February 2016
Other [RH Research Sub Committee Approval Letter]	v1.0	12 February 2016
Other [Demographic Info Sheet]	v1.1	26 May 2016
Other [Email confirming HRA Approval required]		19 August 2016
Other [Email with decision tool]		19 August 2016
Other [Schedule of Events]	2	20 August 2016
Other [NHS to NHS form]		
Other [Statement of Activities]	2	30 August 2016
Participant consent form [Consent Form]	v1.1	18 May 2016
Participant consent form [ICF]	1.2	20 August 2016
Participant information sheet (PIS) [Participant Information Sheet]	v1.1	18 May 2016
Participant information sheet (PIS) [PIS]	1.2	20 August 2016
Research protocol or project proposal [Research Proposal Submitted to RH Research Sub Committee]	v1.0	02 December 2015
Research protocol or project proposal [Protocol]	1.1	26 August 2016
Summary CV for Chief Investigator (CI) [Summary CV Danelle Pettman]	v1.0	18 May 2016
Summary CV for student [Summary CV Danelle Pettman]	v1.0	18 May 2016
Validated questionnaire [GAD_7]	v1.0	18 May 2016
Validated questionnaire [PHQ_9]	v1.0	18 May 2016
Validated questionnaire [CCCRSv5]	v1.0	18 May 2016

IRAS project ID	208947

Appendix B - Summary of HRA Assessment

This appendix provides assurance to you, the sponsor and the NHS in England that the study, as reviewed for HRA Approval, is compliant with relevant standards. It also provides information and clarification, where appropriate, to participating NHS organisations in England to assist in assessing and arranging capacity and capability.

For information on how the sponsor should be working with participating NHS organisations in England, please refer to the*, participating NHS organisations*, *capacity and capability* and *Allocation of responsibilities and rights are agreed and documented (4.1 of HRA assessment criteria)* sections in this appendix.

The following person is the sponsor contact for the purpose of addressing participating organisation questions relating to the study:

Lucy Caton (01784 414317, Lucy.Caton@rhul.ac.uk)

HRA assessment criteria

Section	HRA Assessment Criteria	Compliant with Standards	Comments
1.1	IRAS application completed correctly	Yes	No comments
2.1	Participant information/consent documents and consent process	Yes	No comments
3.1	Protocol assessment	Yes	No comments
4.1	Allocation of responsibilities and rights are agreed and documented	Yes	The applicant has provided a statement of activities to act as agreement of participating NHS organisations to take part in the study.
4.2	Insurance/indemnity arrangements assessed	Yes	Where applicable, independent contractors (e.g. General Practitioners) should ensure that the professional indemnity provided by their medical defence organisation covers the activities expected of them for this research study

Section	HRA Assessment Criteria	Compliant with Standards	Comments
4.3	Financial arrangements assessed	Yes	The applicant has confirmed in the statement of activities that the sponsor will not provide any funding to sites
5.1	Compliance with the Data Protection Act and data security issues assessed	Yes	No comments
5.2	CTIMPS – Arrangements for compliance with the Clinical Trials Regulations assessed	Not Applicable	No comments
5.3	Compliance with any applicable laws or regulations	Yes	No comments
6.1	NHS Research Ethics Committee favourable opinion received for applicable studies	Not Applicable	No comments
6.2	CTIMPS – Clinical Trials Authorisation (CTA) letter received	Not Applicable	No comments
6.3	Devices – MHRA notice of no objection received	Not Applicable	No comments
6.4	Other regulatory approvals and authorisations received	Not Applicable	No comments

Participating NHS Organisations in England

This provides detail on the types of participating NHS organisations in the study and a statement as to whether the activities at all organisations are the same or different.
There is one site type for the research, all sites will undertake the same activity. The Chief Investigator or sponsor should share relevant study documents with participating NHS organisations in England in order to put arrangements in place to deliver the study. The documents should be sent to both the local study team, where applicable, and the office providing the research management function at the participating organisation. For NIHR CRN Portfolio studies, the Local LCRN contact should also be copied into this correspondence. For further guidance on working with participating NHS organisations please see the HRA website. If chief investigators, sponsors or principal investigators are asked to complete site level forms for

participating NHS organisations in England which are not provided in IRAS or on the HRA website, the chief investigator, sponsor or principal investigator should notify the HRA immediately at hra.approval@nhs.net. The HRA will work with these organisations to achieve a consistent approach to information provision.

Confirmation of Capacity and Capability

This describes whether formal confirmation of capacity and capability is expected from participating NHS organisations in England.

Participating NHS organisations in England **will be expected to formally confirm their capacity and capability to host this research**.

- Following issue of this letter, participating NHS organisations in England may now confirm to the sponsor their capacity and capability to host this research, when ready to do so. How capacity and capacity will be confirmed is detailed in the *Allocation of responsibilities and rights are agreed and documented (4.1 of HRA assessment criteria)* section of this appendix.
- The Assessing, Arranging, and Confirming document on the HRA website provides further information for the sponsor and NHS organisations on assessing, arranging and confirming capacity and capability.

Principal Investigator Suitability

This confirms whether the sponsor position on whether a PI, LC or neither should be in place is correct for each type of participating NHS organisation in England and the minimum expectations for education, training and experience that PIs should meet (where applicable).

Local collaborators will be expected at site to facilitate access for external researchers.

GCP training is not a generic training expectation, in line with the HRA statement on training expectations.

HR Good Practice Resource Pack Expectations

This confirms the HR Good Practice Resource Pack expectations for the study and the pre-engagement checks that should and should not be undertaken

Honorary research contracts and letters of access will not be expected as external staff will only access non-clinical areas and have contact with staff and anonymous data.

Other Information to Aid Study Set-up

This details any other information that may be helpful to sponsors and participating NHS organisations in England to aid study set-up.

The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio.

Appendix G. Individual Case Formulation Training Workshop Materials

Please contact the author for workshop materials

Appendix H. Case Vignette

Dear *******

Would you please see Mrs Smith, a 68-year old divorced woman who is seeking help for anxiety. She lives alone, apart from her two lodgers. She has not worked full-time since she was 50. She was very unwell this winter due to a long viral illness and she was unable to go out. She has a daughter and young granddaughter in London and sees them regularly. She is the youngest of three sibs; her older brother and sister are now deceased.

She is not on any medication apart from Zopiclone, occasionally, to help her to sleep. She has an occasional glass of wine in the evening, which helps her to relax.

She complains of "her mind running away with her" and "living in fear" a lot of the time. She sleeps poorly, with frequent waking, at which point she may get up and walk the streets to distract herself. She cannot sleep away from her own home, except occasionally at her daughter's. Recently, she feels restless and cannot sit in the same position for a long time. She wears loose clothing as tight clothes make her feel restricted and trapped. She drives a car but dreads traffic jams. When she has anxious thoughts, she feels she is losing her mind because she cannot control the thoughts. She worries that she is becoming mentally ill. With some thoughts she has "an adrenalin rush" and sometimes retches. She has the radio and TV on most of the time and listens

to audiotapes as a way of getting to sleep. She can be panicky all day, and dislikes spending time alone at home. However, apart from visiting her daughter, her social life is limited, and she fears rejection.

She first became aware of her anxiety at age 40 when her sister was diagnosed with cancer, dying 10 years later. Her mother had a "breakdown" and she had to bring her back (from Europe) to live in London. Her mother lived for a further 8 years before her death. This was a stressful period and Mrs Smith was given medication and saw a therapist for 4 years, from which she benefited.

She has worrying thoughts about her own health, believing that any "twinge" might be a sign of cancer. She reads about illnesses in newspapers but dislikes seeing doctors and being examined. She says she would rather die than go into hospital. She fears something happening to her when away from home and having to stay in a hospital overnight. She wants her brain "to be back in control". If unable to return to her own home, she believes she would experience uncontrolled panic.

Although very close to daughter, she doesn't want to feel "needy". She worries about being rejected by her. She won't tell her if she has been made upset because she thinks this would mean she had failed as a mother. She says "she doesn't know how to argue" and “hates having words”. When her daughter is "terse" she knows she shouldn't be "so sensitive. I know it's me and not her."

Three years ago she attended a mindfulness group and benefited greatly. She was able to travel abroad but now cannot entertain the idea.

Relevant family history

Mrs Smith says that neither parent was able to express their emotions through words.

Age 14, her father left her mother for another woman but returned after a year. Her mother had a "breakdown". She found her mother "not breathing" after an overdose, with a "rattle in her throat." She apparently "died twice in the ambulance" when taken to hospital. Mrs Smith felt her function as a child was to hold the marriage together.

Her father was not told that he was dying (a cardiovascular disease) although everyone in the family knew this was so. No-one spoke about her father after the funeral.

Mrs Smith married her boyfriend after splitting with him, and then discovering she was pregnant.

Appendix I. Pre Workshop Formulation Form (Training Case)

Formulation training diagram form

1. Please provide a concise summary of your client's presenting problem based on the information you have collected in your assessment.

2. Please explain the symbols you will be using in your diagram

   Example: Boxes = behaviours; Single headed arrows = shows one thing causing another

3. On the following page, please provide a diagram of the client's problem that conveys how you have formulated their problem in order to guide your intervention.

Your formulation diagram:

Appendix J. Post Workshop Formulation Form

Your formulation diagram:

Appendix K. Pre Workshop Formulation Form (Vignette Case)

Formulation training diagram form

1. Please explain the symbols you will be using in your diagram

   Example: Boxes = behaviours; Single headed arrows = shows one thing causing another

2. On the following page, please provide a diagram of the client's problem that conveys how you have formulated their problem in order to guide your intervention.

Your formulation diagram:

Appendix L. Demographic Information Form

Participant ID _____

Participant Demographics

1. Age: _____

2. Gender:_____

3. Core Profession: _____

4. Professional bodies I am accredited with: _____
   _____
   _____

5. How many months of clinical experience did you have prior to training?

   _____ months

6. How many months had you been qualified in your profession at the start of HI training?
   _____ months

7. Please could you estimate the total number of CBT cases you had seen prior to training? (please differentiate between IAPT low intensity cases and other CBT Cases)

   _____Cases

8. How many years of further education had you attended prior to training? _____Years

9. Did you have a low intensity postgraduate certificate CBT prior to training:_____

10. Please specify any previous individual case formulation or case conceptualisation training you may have attended (e.g. workshops)…

_____

_____

Appendix M. ICF Rating Scale Individual case formulation rating scale

A. The problem is clearly defined in terms of how observations inter-relate.

1. The nature and source of observations are made clear and explicit, and observations are not confused with explanations.

0 – The diagram mainly consists of observations that are not described with sufficient precision. Sources of information are not made clear, which may create ambiguity about whether information provided is based on supposition or speculation rather than reflecting what has been reported or directly observed.

1 – A substantial proportion of observations in the diagram are not described with sufficient precision, or sources of information are unclear. There may be some instances of observations appearing to be based at least in part on inference or supposition.

2 - Descriptions of observations are sometimes ambiguous or insufficiently precise, or sources of information are sometimes not clear, or there is minor or infrequent ambiguity regarding whether observations are based on inference or supposition.

3 - Sufficiently detailed and precise descriptions of observations are provided and sources of information are made clear if they are not self-evident. These are based on what is directly observable and/or what can be determined with minimal inference or speculation.

2. The nature and basis for how observations relate to each other is made clear

0 – For the most part, it is not possible to readily discern how observations are thought to be linked and to follow from each other. The positioning of observations in relation to each other and the links portrayed between them seem arbitrary or loosely based on a common theme rather than representing sensible contingent relationships. What is provided bears little resemblance to how events inter-relate in real-life, and the diagram does not appear to depict a plausible configuration of circumstances.

1 – There is considerable ambiguity in the diagram regarding the positioning of observations in relation to each other and the use of linking symbols to convey the nature of their contingent relationships, leaving the intention of what is

being depicted difficult to fully understand and to infer the set of real-life circumstances to which the diagram corresponds.

2 – There is minor ambiguity in the diagram regarding the positioning of observations in relation to each other and the use of linking symbols to convey the nature of contingent relationships. However, where this occurs, what is intended can be readily inferred, and it is possible to imagine a set of real-life circumstances to which the diagram corresponds.

3 – For the most part, the basis for how observations are linked to each other is made clear through their relative positioning within the diagram and through clear use of linking symbols (e.g., specifying if causally related or correlated and direction of causality). The nature of contingencies between observations and how they are thought to increase the likelihood of each other's occurrence is readily understood and corresponds sensibly to a potential real-life situation.

3. Explanations (hypotheses, theories, membership in a diagnostic group or other typology, inferred aetiology, inferred historical processes or developmental events) are included that are distinct from observations. These are used to help synthesise and make sense of the information included in the diagram.

0 – Needed explanations are lacking and little is provided by way of conceptual synthesis.

1 – Insufficient explanations are provided to complement what can be portrayed by the observations alone. Provided explanations are unclear or it is not immediately apparent what the basis is for relating the explanation to the particular observations.

2 – Sufficient explanations are provided that are clearly linked to relevant observations, but there is some lack of clarity about the conceptual basis for explanations or their relevance to the observations.

3 – Provided explanations are clearly and sensibly linked to observations, and they complement what can be addressed by observations alone. The explanations contribute to an integrated conceptual basis for what is represented in the formulation.

4. Key contextual elements are included.

The formulation incorporates contextual elements (moderators) such as time, place, others present or absent, emotional state, and other factors relevant to exacerbation or amelioration of an aspect of the problem in terms of its form and frequency of occurrence. Taken together, they provide a useful context for understanding the

antecedents (both immediate and historical) of the problem and the circumstances under which it presents itself.

0 – Moderators are not included or their presence does not add explanatory value
1 – Some moderators are included but these are isolated or otherwise provide limited information about how they operate and the circumstances in which the problem can be expected to occur.
2 – Moderators are included that help build a contextual picture of the circumstances in which the problem can be expected to occur and the form it takes, but how they operate is incomplete or unclear in some way.
3 – Moderators are included that play a clear role in the formulation and together help build a comprehensive contextual picture of the circumstances in which the significant aspects of the problem can be expected to occur and what form this takes.

5. Functional equivalence between superficially dissimilar elements (either triggers or responses) is denoted where this has implications for understanding the problem. The common function underlying the elements contributes to the delineation of the overall pattern of circumstances that make aspects of the problem more likely to occur.

NA- Not applicable
0 - Functional equivalence is overlooked or not represented when appropriate
1 – Functional equivalence is represented but equivalence is not convincing or doesn't add explanatory value.
2 – Functional equivalence is represented but equivalence is not fully convincing or adds little explanatory value
3 - Functional equivalence is represented convincingly and in a way that contributes to understanding of the patterns of circumstances within which the problem is likely to occur.

6. Significant mediators are identified and their roles are made clear

Potential psychological (e.g., client self-talk and content of beliefs) or other mediators (e.g., mood) are identified through the client's report or, where clearly justified by the evidence, through inference. These are meaningfully situated within the diagram in a manner that makes their role clear.

0 – Mediators are not included where they would be expected to play a role or their presence or how they are described is confusing or otherwise does not add explanatory value

1 – Mediators are included but their linking function between the other observations to which they are related is not convincingly established or made clear.
2 – Mediators are included that meaningfully link indirectly related observations but there is some lack of clarity about the nature of its mediation role or its necessity in the causal sequence in which it plays a part.
3 – Mediators are included that meaningfully link indirectly related observations in a way that sheds light on their necessity in the causal sequence in which they play a part.

Appendix N: ICF Dichotomous Checklist Individual Case Formulation Dichotomous Checklist

Please rate each item for either present if there is evidence that it is displayed in the diagram or not present if this convention is not displayed

B. The problem is clearly defined in terms of how observations inter-relate.

7. The nature and source of observations are made clear and explicit, and observations are not confused with explanations.

Present

Absent

8. The nature and basis for how observations relate to each other is made clear

Present

Absent

9. Explanations (hypotheses, theories, membership in a diagnostic group or other typology, inferred aetiology, inferred historical processes or developmental events) are included that are distinct from observations. These are used to help synthesise and make sense of the information included in the diagram.

Present

Absent

10. Key contextual elements are included.

The formulation incorporates contextual elements (moderators) such as time, place, others present or absent, emotional state, and other factors relevant to exacerbation or amelioration of an aspect of the problem in terms of its form and frequency of occurrence. Taken together, they provide a useful context for understanding the antecedents (both immediate and historical) of the problem and the circumstances under which it presents itself.

Present

Absent

11. Functional equivalence between superficially dissimilar elements (either triggers or responses) is denoted where this has implications for understanding the problem. The common function underlying the elements contributes to the delineation of the overall pattern of circumstances that make aspects of the problem more likely to occur.

Present

Absent

12. Significant mediators are identified and their roles are made clear

Potential psychological (e.g., client self-talk and content of beliefs) or other mediators (e.g., mood) are identified through the client's report or, where clearly justified by the evidence, through inference. These are meaningfully situated within the diagram in a manner that makes their role clear.

Present

Absent

C. Validity and Explanatory sufficiency

13. The formulation is a coherent and comprehensive account of the available information. The diagram integrates and structures the information to draw together all the factors comprising and influencing the problem and portrays their patterns of interaction.

Present

Absent

14. The formulation delineates mechanisms of change in terms of the elements (observations and explanations) depicted in the diagram and their connections, and provides a basis for understanding where and how to intervene and what to prioritise.

Present

Absent

15. The formulation manages complexity successfully.

Present

Absent

Appendix O. Cognitive Therapies Scale Revised (CTS-R)

ITEM 1 – AGENDA SETTING AND ADHERENCE

Competence level	Examples NB: Score according to features, not examples!
0	No agenda set, highly inappropriate agenda set, or agenda not adhered to.
1	Inappropriate agenda set (eg. lack of focus, unrealistic, no account of patient's presentation, homework not reviewed.
2	An attempt at an agenda made, but major difficulties evidence (eg. Unilaterally set). Poor adherence.
3	Appropriate agenda, which was set well, but some difficulties evident (eg. Poor collaboration). Some adherence.
4	Appropriate agenda, minor difficulties evident (eg. no prioritization), but appropriate features covered (eg. review of homework). Moderate adherence.
5	Appropriate agenda set with discrete and prioritized targets – review at the end. Agenda adhered to. Minimal problems.
6	Excellent agenda set, or highly effective agenda set in the face of difficulties.

ITEM 2 – FEEDBACK

Competence level	Examples NB: Score according to features, not examples!
0	Absence of feedback or highly inappropriate feedback.
1	Minimal appropriate feedback (verbal and/or written)
2	Appropriate feedback, but not given frequently enough by therapist, with insufficient attempts to elicit and give feedback, eg. feedback too vague to provide opportunities for understanding and change.
3	Appropriate feedback given and elicited frequently, although some difficulties evident in terms of content or method of delivery.

4	Appropriate feedback given and elicited frequently, facilitating moderate therapeutic gains. Minor problems evident (eg. inconsistent).
5	Highly appropriate feedback given and elicited regularly, facilitating shared understanding and enabling significant therapeutic gains. Minimal problems.
6	Excellent use of feedback, or highly effective feedback given and elicited regularly in the face of difficulties.

ITEM 3 – COLLABORATION

Competence level	**Examples** NB: Score according to features, not examples!
0	Patient is actively prevented or discouraged from being collaborative.
1	The therapist is too controlling, dominating, or passive.
2	Some occasional attempt at collaboration, but didactic style or passivity of therapist encourages passivity or other problems in the therapeutic relationship.
3	Teamwork evident, but some problems with collaborative set (eg. not enough time allowed for the patient to reflect and participate actively).
4	Effective teamwork is evident, but not consistent. Minor problems evident.
5	Effective teamwork evident throughout most of the session, both in terms of verbal content and use of written summaries. Minimal problems.
6	Excellent teamwork, or highly effective teamwork in the face of difficulties.

ITEM 4 – PACING AND EFFICIENT USE OF TIME

Competence level	**Examples** NB: Score according to features, not examples!
0	Poor time management leads either to an aimless or overly rigid session.
1	The session is too slow or too fast for the current needs and capacity of the patient.

2	Reasonable pacing, but digression or repetitions from therapist and/or patient lead to inefficient use of time; unbalanced allocation of time, over time.
3	Good pacing evident some of the time, but diffuse at times. Some problems evident.
4	Balanced allocation of time with discrete start, middle and concluding phases evident. Minor problems evident.
5	Good time management skills evident, session running smoothly. Therapist working effectively in controlling the flow within the session. Minimal problems.
6	Excellent time management, or highly effective management evident in the face of difficulties.

ITEM 5 – INTERPERSONAL EFFECTIVENESS

Competence level	**Examples** NB: Score according to features, not examples!
0	Therapist's manner and interventions make the patient disengage and become distrustful and/or hostile (absence of/or excessive I, ii, iii).
1	Difficulty in showing empathy, genuineness and warmth.
2	Therapist's style (eg. intellectualization) at times impedes his/her empathic understanding of the patient's communications.
3	The therapist is able to understand explicit meanings of patient's communications, resulting in some trust developing. Some evidence of inconsistencies in sustaining a relationship.
4	The therapist is able to understand the implicit, as well as the explicit meanings of the patient's communications and demonstrates it in his/her manner. Minor problems evident (eg. inconsistent).
5	The therapist demonstrates very good interpersonal effectiveness. Patient appears confident that he/she is being understood, which facilitates self-disclosure. Minimal problems.
6	Highly interpersonally effective, even in the face of difficulties.

ITEM 6 – ELICITING OF APPROPRIATE EMOTIONAL EXPRESSION

Competence level	Examples NB: Score according to features, not examples!
0	Patient is under- or over-stimulated (eg. his/her feelings are ignored or dismissed or allowed to reach an unmanaged pitch). Or the therapist's own mood or strategies (eg. intellectualization) adversely influences the session.
1	Failure to facilitate access to, and expression of, appropriate emotional expression.
2	Facilitation of appropriate emotional expression evident, but many relevant opportunities missed.
3	Some effective facilitation of appropriate emotional expression, created and/or maintained. Patient enabled to become slightly more aware.
4	Effective facilitation of appropriate emotional expression leading to the patient becoming more aware of relevant emotions. Minor problems evident.
5	Very effective facilitation of emotional expression, optimally arousing the patient's motivation and awareness. Good expression of relevant emotions evident – done in an effective manner. Minimal problems.
6	Excellent facilitation of appropriate emotional expression, or effective facilitation in the face of difficulties.

ITEM 7 – ELICITING KEY COGNITIONS

Competence level	Examples NB: Score according to features, not examples!
0	Therapist fails to elicit relevant cognitions.
1	Inappropriate cognitions and emotions selected, or key cognitions/emotions ignored.
2	Some cognitions/emotions (or one key cognition, eg. core belief) elicited, but links between cognitions and emotions not made clear to patient.
3	Some cognitions/emotions (or one key cognition) elicited in a competent way, although some problems evident.
4	A number of cognitions and emotions (or one key cognition) elicited in verbal or written form, leading to a new understanding of their

relationship. Minor problems evident.

5 Effective eliciting and selection of a number of cognitions/emotions (or one key cognition), which are generally dealt with appropriately. Minimal problems.

6 Excellent work done on key cognition(s) and emotions(s), even in the face of difficulties.

ITEM 8 – ELICITING AND PLANNING BEHAVIOURS

Competence level	**Examples** NB: Score according to features, not examples!
0	Therapist fails to elicit relevant behaviours and plans.
1	Inappropriate behaviours focused on and/or plans generated.
2	Some behaviours and plans elicited, but links between behaviours, cognitions and emotions not made clear to patient.
3	Some behaviours and plans elicited in a competent way, although some problems evident.
4	A number of behaviours and plans elicited in verbal or written form, leading to a new understanding of their importance in maintaining problems. Minor difficulties evident.
5	Effective eliciting and selection of a number of behaviours and plans, which are generally dealt with appropriately. Minimal problems.
6	Excellent work done on behaviours and plans, even in the face of difficulties.

ITEM 9 – GUIDED DISCOVERY

Competence level	**Examples** NB: Score according to features, not examples!
0	No attempt at guided discovery (eg. hectoring and lecturing).

1	Little opportunity for discovery by patient. Persuasion and debate used excessively.
2	Minimal opportunity for discovery. Some use of questioning, but unhelpful in assisting the patient to gain access to his/her thoughts or emotions or to make connections between themes.
3	Some reflection evident. Therapist uses primarily a questioning style which is following a productive line of discovery.
4	Moderate degree of discovery evident. Therapist uses a questioning style with skill, and this leads to some synthesis. Minor problems evident.
5	Effective reflection evident. Therapist uses skilful questioning style leading to reflection, discovery and synthesis. Minimal problems.
6	Excellent guided discovery leading to a deep patient understanding. Highly effective discovery produced in the face of difficulties, with evidence of a deeper understanding having been developed.

ITEM 10 – CONCEPTUAL INTEGRATION

Competence level	**Examples** NB: Score according to features, not examples!
0	The absence of an appropriate conceptualization.
1	The lack, or inappropriateness or misapplication of a conceptualization leads to a neutral impact (eg. interferes with progress or leads to aimless application of procedures).
2	Some rudimentary conceptualization arrived at, but not well integrated with goals of therapy. Does not lead to a clear rationale for interventions.
3	Cognitive conceptualization partially developed with some integration, but some difficulties evident (eg. in synthesizing and in sharing it with the patient). Leads to coherent interventions.
4	Cognitive conceptualization is moderately developed and integrated within the therapy. Minor problems evident.
5	Cognitive conceptualization is very well developed and integrated within the therapy – there is a credible cognitive understanding leading to major therapeutic shifts. Minimal problems.
6	Excellent development and integration evident, or highly effective in the face of difficulties.

ITEM 11 – APPLICATION OF CHANGE METHODS

Competence level	**Examples** NB: Score according to features, not examples!
0	Therapist fails to use or misuses appropriate cognitive and behavioural methods.
1	Therapist applies either insufficient or inappropriate methods, and/or with limited skill or flexibility.
2	Therapist applies appropriate methods, but major difficulties evident.
3	Therapist applies a number of methods in competent ways, although some problems evident (eg. the interventions are incomplete).
4	Therapist applies a range of methods with skill and flexibility, enabling the patient to develop new perspectives. Minor problems evident.
5	Therapist systematically applies an appropriate range of methods in a creative, resourceful and effective manner. Minimal problems.
6	Excellent range and application, or successful application in the face of difficulties.

ITEM 12 – HOMEWORK SETTING

Competence level	**Examples** NB: Score according to features, not examples!
0	Therapist fails to set homework, or sets inappropriate homework.
1	Therapist does not negotiate homework. Insufficient time allotted for adequate explanation, leading to ineffectual task being set.
2	Therapist negotiates homework unilaterally and in a routine fashion, without explaining the rationale for new homework.
3	Therapist has set an appropriate new homework task, but some problems evident (eg. not explained sufficiently and/or not developed jointly).
4	Appropriate new homework jointly negotiated with clear goals and rationales. However, minor problems evident.
5	Appropriate homework negotiated jointly and explained well, including

6		an exploration of potential obstacles. Minimal problems. Excellent homework negotiated, or appropriate one set in the face of difficulties.

Appendix P. Workshop Feedback Form

Lecture/Workshop Feedback Form

Date:

Lecture Title:

Part A:

1) Appropriate Level [1=Not appropriate; 4=Very appropriate]

1 2 3 4

3) Perceived Usefulness [1=Not useful; 4=Very useful]

1 2 3 4

Part B:

1) Please provide feedback for your lecturer/speaker (What did you most appreciate about today's session?

2) What changes/ additions could be made to improve the session in the future?

3) Please provide feedback for the course team about today's session:

Appendix Q. Generalised Anxiety Disorder 7-item Scale

Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
Add the score for each column	+	+	+	
Total Score *(add your column scores)* =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

Appendix R. Patient Health Questionnaire

Patient Name _____ Date of Visit _____

Over the past 2 weeks, how often have you been bothered by any of the following problems?	Not At all	Several Days	More Than Half the Days	Nearly Every Day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling asleep, staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself - or that you're a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite - being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
Column Totals	_____	+ _____	+ _____	
Add Totals Together	_____			

Appendix S. Equation for Calculating Cut Off Points for Clinically Significant Change.

Taken from (Jacobsen and Truax (1991).

Calculating a cut-off point using the RCI involves assessing if the post-intervention score is closer to the mean of the 'functional' population than it is to the 'dysfunctional' population using the following equation:

$$c = \frac{s0M1 + S1Mo}{S0 + S1}$$

C= cut-off for clinically significant change, s0= Standard Deviation (SD) of the 'functional population', s1 = SD of pre-intervention 'dysfunctional population', Mo = Mean of the 'functional population' and M1 = mean of pre-intervention 'dysfunctional population'.

Appendix T. Scree plot of the eigenvalues of the ICF-RS components.

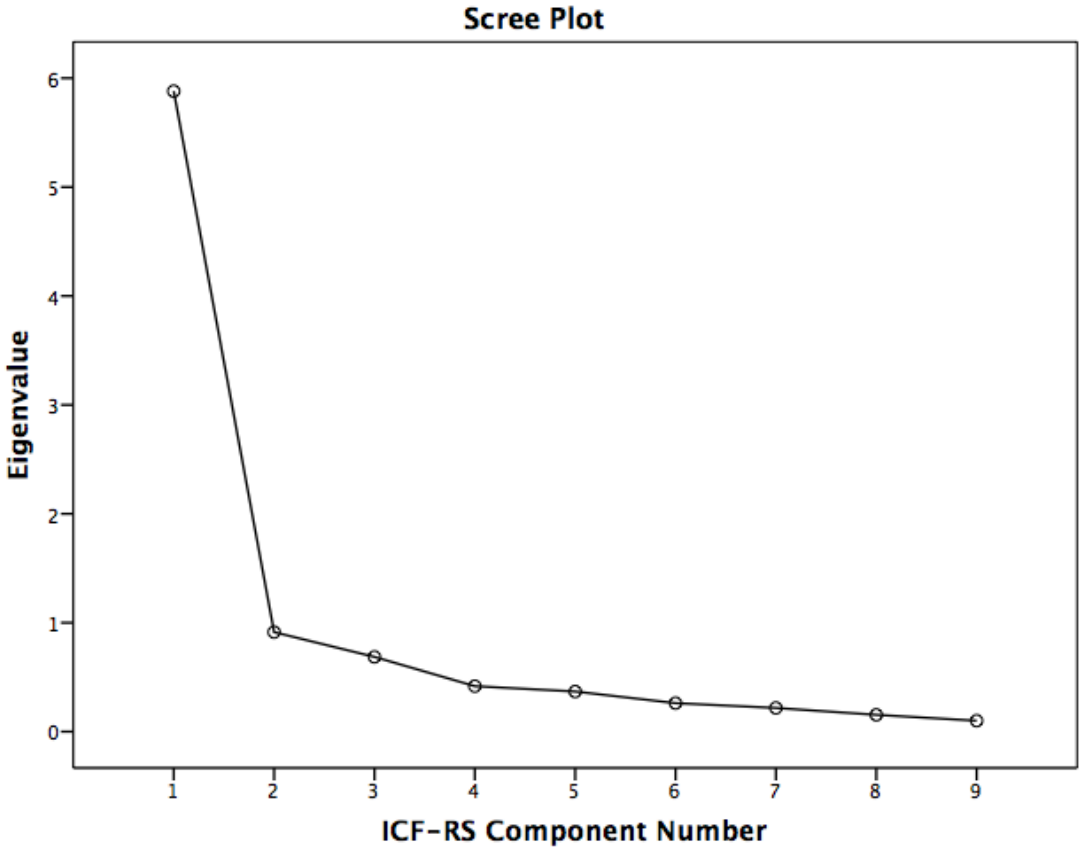

Figure X: Scree plot of principal components analysis for the ICF-RS